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CYSTS OF THE MARGIN OF THE EYELID*

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The not-uncommon cysts that appear at the margin of the eyelid are generally considered to develop from occlusion of the ducts of the modified sweat glands (Moll's glands) secondary to hyperkeratosis, inflammation. Theoretically, they are divided into two classes: cysts developing from the tubules and those from the ducts.[1] In recent years, however, little attention has been paid to their histology.

According to Gans,[2] in the field of dermatology, cysts of the sweat-gland tubules are not frequently found; their existence has even been denied by Unna. They appear in the neighborhood of proliferative processes of the skin (carcinoma, tuberculosis). In addition to these cysts, which develop secondarily, a primary cystic hypertrophy may be found in pregnancy.

Cysts of the ducts are more frequent and are often secondary to other processes. The poruscysts, developing at the distal end of the duct, appear and disappear within a relatively short time.

The hydrocystoma, a variety of the sweat-gland cyst, is the type which most closely resembles the cysts of the eyelid margin. Its wall, lined by a nonkeratinizing epithelium, often shows papillae. Various possibilities as to its etiology are given (inflammation, congenital anomalies). Clinically, however, these cysts differ, according to Gans, from those of the margin of the eyelid in so far as they develop rapidly, and, without rupturing, shrink, and disappear, whereas cysts of the margin of the eyelid develop slowly and continuously, attaining a rather considerable size, and, as a rule, do not disappear nor shrink. In many cases the margin of the eyelid is apparently normal in all other respects, so that a local inflammatory process seems highly improbable. Evidence of a more generalized involvement of the sweat glands of the skin is often absent, although at the margin of the eyelid itself several of these cysts may appear at the same time. In addition there has occasionally been observed a malign degeneration of a hydatid,[3] which is difficult to explain on the basis of a simple occlusion.

On the other hand it is a well-established fact that usually these cysts disappear following puncture or after incision of the dome, although a recurrence is not uncommon.

It is rather difficult to study the mode of origin of these cysts, since to effect a complete extirpation, including the surrounding tissue, is not easily possible without permanently disfiguring the margin of the eyelid.

One of my patients had, in addition to the cysts of the eyelid, some small cystic nodules in the skin, all of which I removed. As is evident from figure 1, the anomaly in the skin was neither a simple cyst of the sweat glands nor a hydrocystoma, but resembled at first sight a simple milium. In addition to the cysts

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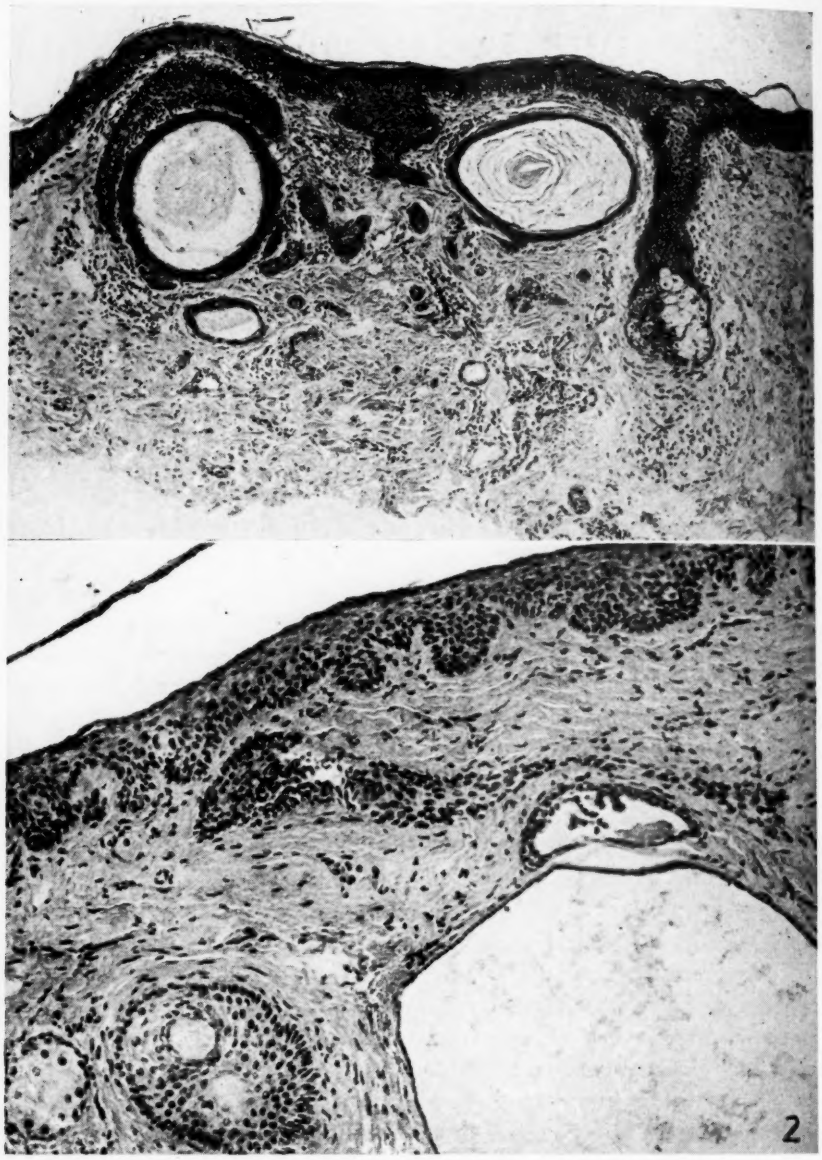

Fig. 1 (Hagedoorn). Syringoma of the skin of the eyelid in a case of cysts of the margin of the eyelid.

Fig. 2 (Hagedoorn). Strand of epithelial cells in other sections continuous with the surface epithelium.

there were rudimentary tubules and epithelial strands lying in the tissue under the epithelium, typical of a congenital anomaly, a syringoma; which supports the view that the cysts of the margin of the eyelid are likewise not due to a simple occlusion of the normal glands.

Recently I had a patient who, because of the frequency of carcinoma in his family, insisted upon a wide extirpation of a small cyst on his eyelid. Thus I was able to study microscopically not only the

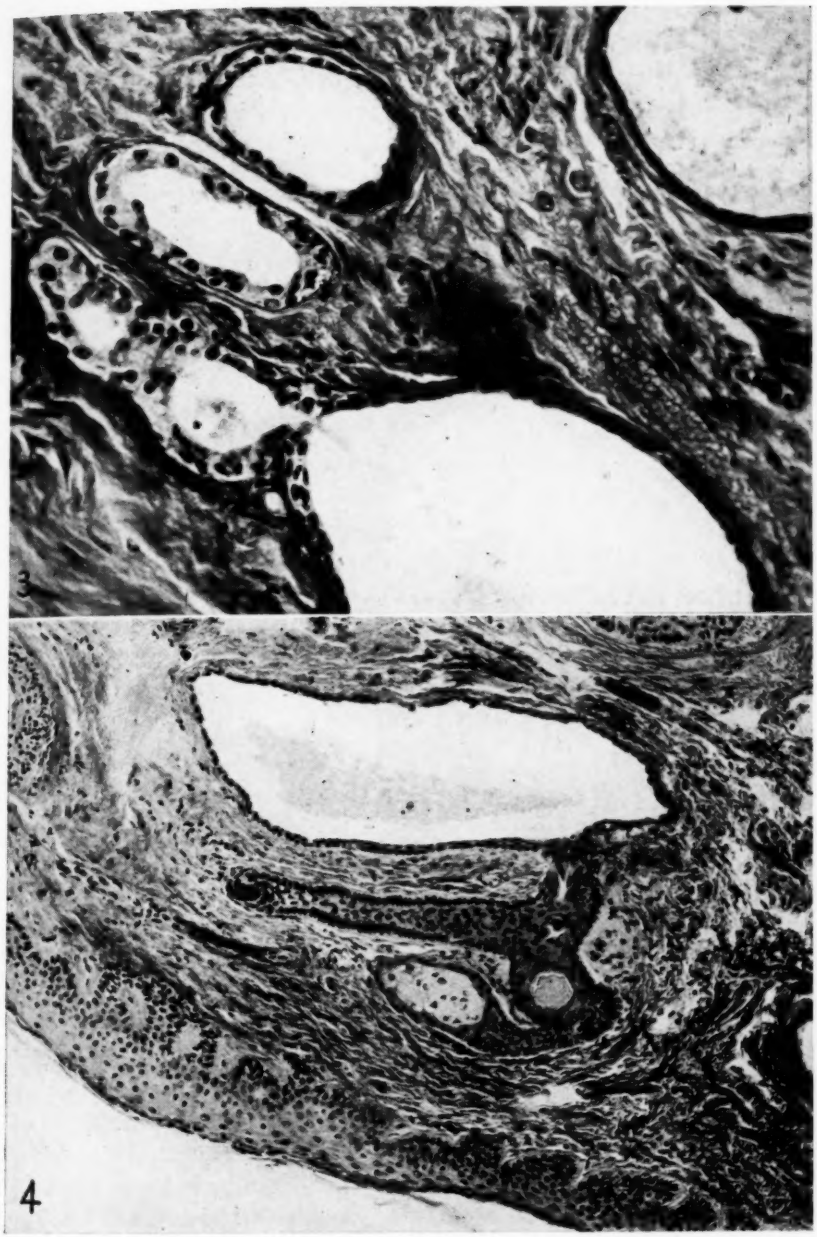

Fig. 3 (Hagedoorn). Sweat-gland tubules and sweat-gland cysts.
Fig. 4 (Hagedoorn). Atypical hair follicle with a cyst originating from a sebaceous gland.

cyst but the surrounding tissue as well. The epithelium was normal, but occasionally a solid strand of epithelial cells penetrated into the underlying tissue between the cysts (fig. 2). The epithelium contained little or no pigment, with the exception of one area in which a considerable pigmentation of the basal cells

was present, with a few scattered pigmented cells in the subepithelial tissue. Nests of typical nevus cells, however, could not be found. Many cysts of varying size were present.

Figure 3 shows cysts, related to sweat glands, still continuous with the sweat-gland tubules.

Figure 4 shows that in this same specimen there were atypical hair follicles. On one side of the hair follicles a sebaceous gland was present whereas on the other side there was a large cyst. Thus some of the cysts were related to sebaceous glands.

Figure 5 demonstrates that these hair follicles may be considerably malformed, being composed chiefly of epithelial strands.

Thus this cyst developed in a region which was congenitally abnormal. The sections revealed the fact that cysts may originate both from the sweat glands and the sebaceous glands.

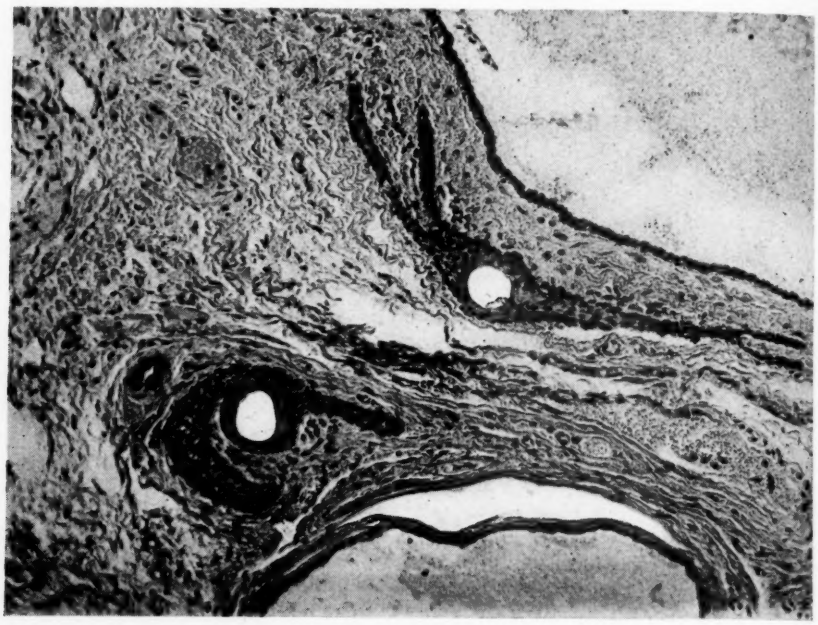

Fig. 5 (Hagedoorn). Malformed hair follicles.

The region from which the cyst developed may be called, using the terminology of Gans and other authors, a nevus; that is, a circumscribed anomaly of the skin which, though of congenital origin, is not, however, necessarily present at birth, but may develop at any age. Other authors retain the name nevus solely for those anomalies of the skin in which so-called nevus-cells are present; that is, pigmented cell nests in the subcutaneous tissue.

Probably cysts at the margin of the lid develop more frequently from such congenitally malformed areas than by a simple occlusion of normal glandular elements. Such an origin offers a better explanation of the clinical course as well as of the occasional malignant degeneration.

Summary

Cysts of the margin of the eyelid may originate from congenitally malformed areas and from both sweat-gland and

sebaceous-gland elements. A case is reported in which a cyst of the eyelid occurred simultaneously with a syringoma of the skin. A second case which could be studied microscopically showed that the cyst developed from an area which contained anomalies of the epithelium, hair follicles, sweat glands, and sebaceous glands.

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THE ROLE OF TRANSFUSION IN OPHTHALMOLOGY*

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Introduction

The therapeutic value of blood transfusion has long been recognized in the treatment of the anemias, both primary and secondary, and the various blood dyscrasias. In combating surgical and traumatic shock and in putting an abrupt terminus to the persistent bleeding in hemophilia, the life-saving effect of transfusion is well known; in cases of cyclical purpura, in various forms of hematuria and bleeding from the bowels its effect is little less spectacular.

In the last decade, transfusion has been used with increasing frequency to stimulate the resistance to disease, and to increase the reparative process, in a great number of unrelated pathologic states. As long ago as 1923, Goodman and Speese,[1] in advocating transfusion for conditions other than anemia, said "The effect of the (transfused) blood in sepsis is to lessen the anaemia, to supply active leucocytes, to raise the blood pressure, and by all three to add to the natural defenses of the patient."

Like oxygen, transfusion is no longer reserved for patients *in extremis* nor for those whose hemoglobin has fallen below some arbitrary level. The increasing use of transfusion has resulted from increasing familiarity with the technique of the operation and considerable simplification of the procedure. Today every surgeon, and probably every practitioner who has graduated within the past 15 years from an internship in a first-class hospital, is qualified to perform transfusion. It is safe to say that in no community having hospital facilities is this procedure not available. Yet, despite the widespread use of a well-established and relatively safe and simple therapeutic measure, ophthalmologists in general have found few uses for transfusion. In the extraordinarily voluminous literature on transfusion, references to the employment of transfusion for eye conditions are extremely meager. Of 1,600 items on transfusion in general, listed in the 20 volumes of the Cumulative Index Medicus (from 1927 to 1936), only 11 have any bearing on ophthalmology.

History and technique

Prior to 1910 frequent serious accidents had made transfusion a dangerous

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procedure only to be resorted to in desperate cases. The discovery by Jansky (1907) and Moss (1910) of blood typing demonstrated that transfusion could be safely carried out when preliminary testing of the blood of the donor and recipient showed that the serum of neither would cause agglutination nor hemolysis of the cells of the other. The hazards of transfusion have been further reduced by the Wassermann and Widal tests, and by the microscopic recognition of malarial and other parasitical blood-stream infestations, so that now the profession and the public regard this delicate operation with the complacence of familiarity.

When transfusion is done by the citrate method the entire amount of the transfusion is withdrawn from the vein of the donor into a receptacle containing a minimal amount of anticoagulating substance, and is then slowly infused by gravity into the recipient's vein. There are several methods of direct, whole-blood transfusion; in all of them the donor is in close proximity to the recipient and the blood is withdrawn from the donor's vein by the negative pressure of a syringe and then quickly forced into the recipient's vein by a system of tubing and valves, or by disconnecting the syringe from the needle in the donor's vein and connecting it to the needle in the recipient's vein. The latter, multiple-syringe technique, seems the least complicated for the average practitioner who does not specialize in hematology. It expedites the procedure to have a team of two operating so that one may be withdrawing the blood from the donor's vein while the other is injecting it into the recipient's vein.

On purely academic or sentimental grounds, most medical men prefer the transfusion of unchanged whole blood, but abundant evidence has accumulated to show that transfused citrated blood acts just as satisfactorily for every purpose for which transfusion is used.

Transfusion in ophthalmological therapeusis

Although it is the purpose of this paper to consider the various instances where transfusion enters the field of the ophthalmologist, certain of the uses of transfusion are so generally recognized and conceded as to need only brief mention.

The field of medicine in which transfusion has been used most extensively *ab initio* is of course that of the blood dyscrasias—primary anemias and leukemias of all types. The eyeground changes in these conditions are well known. Factors which cause improvement in the underlying blood picture will also favorably affect retinal hemorrhage and exudate. However, any such local ocular effect is merely incidental to the treatment of the disease, and it can hardly be said that in these cases transfusion is employed as a measure of ocular therapy.

Control of hemorrhage

Hemophilia. Emile Delord,[2] of Nimes, France, in April, 1935, reported a case of persistent bleeding following a preliminary iridectomy.

The patient, a 64-year-old male mechanic, with mild diabetes controlled by insulin, had a mature cataract in the left eye and an immature cataract (V = 20/100) in the right eye. Pupillary reactions, light projection, tension, were all normal; the urine was normal. Preliminary iridectomy was performed on the left eye, February 26, 1935. A profuse iris hemorrhage immediately filled the anterior chamber. On the fourth day after the operation the patient complained of severe pain and the tension was 40 mm. Hg. Miotics relieved the pain temporarily,

but recurrence the next day required opening of the wound with a spatula and evacuation of the blood. For control of the pain and secondary glaucoma, it was necessary to reopen the anterior chamber every 12 hours for the next 6 days. The patient then recalled that three times previously he had had severe hemorrhage —twice after dental extractions and once with trauma—all of which had finally been controlled by pressure. No member of the family was hemophilic. Coagulants, six or seven different preparations, had been administered without effect after the fifth day. On March 13th, a transfusion of 300 c.c. of whole blood was given; the pain ceased at once and tension fell to 30 mm. Hg the next day and to 25 mm. the day after. The hyphema was gradually absorbed, and healing was complete 15 days after the transfusion.

The sequel of this case is interesting. Cataract extraction was performed on April 30, 1936, after the patient had been prepared for a month by daily doses of calcium by mouth, and subcutaneous injections of preparations to increase the coagulability of the blood. An extracapsular operation was performed without hemorrhage or other complication. Healing was uneventful and vision of about 20/70 was obtained.[3]

At the Queens General Hospital, there was an unusual case on the Eye Service earlier this year. A boy of six years was admitted, with the anterior chamber of the left eye filled with fresh blood. There had been an injury with scissors months before, which had been treated at the Manhattan Eye, Ear, and Throat Hospital and had cleared up. The present hyphema had occurred spontaneously, and there was not the slightest evidence of local inflammation. He remained in the hospital for more than three months. At first there was no disposition for the blood to become absorbed, or there was constant fresh bleeding—at any rate, the anterior chamber remained filled with red blood. There was no hematin staining of the cornea and the blood formed a fluid level leaving exposed most of the time the upper portion of the blue iris. The patient's blood was studied for hemophilia and other dyscrasias, coagulants were administered in variety (including moccasin venom) without avail. As a last resort a transfusion was given, and from then on the blood was rapidly absorbed from the anterior chamber. A remarkable picture was then disclosed—almost total absorption or atrophy of the iris except for the small upper portion which had been exposed above the fluid level of the hyphema. The vitreous also showed a mass which was apparently either organized hemorrhage or massive exudate.

Retinal hemorrhage. Transfusion is resorted to with increasing frequency for the eclamptic state.

Guerin de Mongareuil-Valmale and Jean Sedan[4] in 1934 reported the case of a young primipara who presented postpartum severe eclamptic seizures and violent retinal hemorrhages in both eyes with almost complete loss of vision. Venesection and blood transfusion were performed. The retinal hemorrhages began to be absorbed at once, there were no more eclamptic attacks, and in a very few days normal vision returned to both eyes.

AMAUROSIS AFTER BLOOD LOSS

In the amaurosis following extensive hemorrhage, it may seem evident that when blood loss has been so great as to affect the eyesight and the fields of vision that the other vital centers are also probably profoundly affected. In such cases transfusion is resorted to as a life-saving procedure, and its reviving effect on the visual centers is incidental.

Maxwell Langdon[5] in 1932 reported to the Section of Ophthalmology of the College of Physicians of Philadelphia a case which provoked considerable comment.

A woman of 39 years with hemoglobin of 45 percent and 1,880,000 red cells, following profuse and prolonged bleeding, had successive transfusions of 300 c.c., 500 c.c., and 500 c.c. of citrated blood. At this time her mental condition became confused and blurred. The ophthalmoscope revealed pale, edematous optic discs, with no hemorrhages. Nine days after admission there was questionable perception of light and no pupillary reaction. Five days later, the fundus appearance was better, and vision was roughly 1/3. Hysterectomy and appendectomy were performed a month later. The mental condition remained confused but vision improved to 6/7½ in the right eye, 6/6 in the left eye, with slight concentric contraction of the visual fields. It was assumed that the visual and mental derangement appearing after the transfusion were a delayed manifestation of the anemia and that complete deterioration and death would have ensued but for the transfusions.

There are cases in which the visual loss is the only arresting sign. A. Fuchs[6] in 1928 reported a case of blindness in a 29-year-old primapara following severe parturient hemorrhage.

At the first examination, 14 hours postpartum, the optic discs were pale, the surrounding retina was pale and edematous, and the vision of both eyes was reduced to the ability to count fingers at 1 meter. A transfusion of 250 c.c. of blood was given at once, the patient reporting improvement in vision even before the conclusion of the transfusion. A second transfusion was given four days later. At the end of the first week the fundus was normal and vision was 6/12. Six weeks later vision was normal and the only abnormal finding was a slight narrowing of the arteries in the inferior portion of the left retina, with corresponding slight contraction of the superior field of vision.

A. E. Goldfeder and K. N. Rapoport[7] in 1934 reported a case of amaurosis in which the hemorrhagic etiology was less obvious.

This 34-year-old peasant woman presented herself to the clinic on December 20, 1931, complaining of loss of vision in the right eye and serious impairment in the left, of two months' duration, occurring three weeks after a profuse menstruation. Metrorrhagia had been present since an abortion some months before. Examination showed pale eyegrounds; vision reduced to the ability to detect hand movements at 25 cm. with the right eye, 6/30 with the left; and visual fields restricted to the fixation points in the right eye, concentrically contracted in the left. General clinical and serological examinations were negative. On January 20, 1932, the pupil of the right eye did not react to light, the field of vision could not be measured, and light could be perceived only above; the left eye had vision of 6/30, with inferior hemianopsia and concentric contraction of the remaining upper field. Both optic-nerve heads presented the picture of atrophy. Meanwhile, the appearance of general anemia was constantly becoming more evident, despite the following blood findings: red blood cells 4,910,000; white blood cells 6,000; hemoglobin 66 percent. On February 5, 1932, 450 c.c. of citrated blood was given intravenously. Four days later vision was O.D. 8/100, O.S. 9/10, and the fields had enlarged. Observation over a period of months revealed continued improvement in the visual fields and some improvement in the color of the optic discs, particularly in the left eye.

The authors conclude that the bene-

ficial effect of transfusion is not due to the mechanical vasodilatation and increased blood bulk, but to a physiological reaction. They present their case as an instance that transfusion may be of benefit even after visual impairment and anemia have existed for several months.

Comment. It has been remarked that loss of vision rarely occurs following traumatic hemorrhage, but may be encountered in the chronic anemias from loss of blood in diseased conditions. It has been assumed that anemia of the retinal and cerebral cells resulted in their degeneration with eventual atrophy of the optic nerve. In the older literature,[8] before transfusion was commonly employed, there are many references to the amaurosis associated with extensive blood loss, and the prognosis was always grave.

It would seem to make little practical difference whether the anemia is the sole factor or whether there is an associated toxic or focal condition causing a retrobulbar neuritis which becomes dominant when the general resistance is lowered by blood loss. In massive transfusion promptly performed, we have, in either case, a means of stopping the degeneration of the nerve elements and offering a good prognosis for preservation of vision.

INFLAMMATORY LESIONS

Whereas the surgeons, otologists, hematologists, pediatricians, and internists have been employing transfusion boldly, and sometimes with striking results, in cases of sepsis and chronic inflammatory disease, ophthalmologists are just beginning, hesitatingly, to explore the possibilities of this therapeutic measure in ocular inflammations. At long intervals and widely scattered, one finds items in the literature detailing these experiences.

Vitreous opacities. For some years past, V. N. Archangelsky, of the Bogdanov Institute for Clinical and Experimental Hematology and Blood Transfusion in Moscow, has been investigating the possibilities of treating various inflammatory eye conditions with transfusion. In 1930 he described[9] the results achieved by transfusion in two cases of vitreous opacities. In both instances there was no observable inflammation of the anterior segment of either eye, and the general examination and laboratory tests were negative. All customary remedies had been employed without effect in clearing the turbidity of the vitreous.

In the first case, the vision was perception of light O.D.; 0.01, O.S. (finger counting at .5 M)—no fundus view obtainable. A transfusion of 200 c.c. of blood was made. Four weeks later the vision was O.D., 0.01; O.S. 0.6-0.7. The patient regarded himself as cured. The right vitreous was only slightly clearer, but in the left flocculent opacities had appeared and the fundus details were visible. The second case was similar.

The vision was O.D. 0.3-0.4; O.S. 0.2-0.3. Despite marked cloudiness of the vitreous, an appearance resembling retinitis proliferans could be made out in the right fundus; no ophthalmoscopic view was obtainable in the left eye.

After the withdrawal of 100 c.c. of blood, a transfusion of 400 c.c. of whole blood was given. Three days later the vision was O.D. 0.7; O.S. 1.5 (!). There was no change in the fundus picture in the right eye—in the left eye the vitreous turbidity was less intense with noticeable flocculi or clumping of exudate.

Archangelsky believed that unquestionably the transfusion and nothing else was responsible for the remarkable improvement in these cases of vitreous opacity. He attempted to account for the clinically observed clearing of the vitreous and clumping of the diffuse opacities by ad-

vancing the hypothesis that the transfusion sets up a shock reaction in the colloid structure of the vitreous.

These cases have been frequently cited in the Russian literature and other similar cases are on record.[10]

Comment. These cases deserve thoughtful consideration.

One may criticize their presentation on the grounds that no etiological diagnosis was made. We may infer that the underlying condition was a posterior uveitis; since the general tests were negative, we may further assume the presence of an unrecognized latent focal infection.

Whether we accept Archangelsky's hypothesis of a specific therapeutic effect upon the vitreous body, or whether, as seems more likely, we attribute the beneficial effect of the transfusion to a stimulation of the host's defenses against the remote focus or the proximal choroidal lesions, seems of little present moment, nor does it detract from the value of this work. As a purely clinical observation, this may be a contribution whose possibilities of extended applicability are not limited to the conditions described. My own results in a similar case did not corroborate Archangelsky's enthusiasm.

S. K., a 27-year-old male, came to me on November 19, 1936, with uveitis and secondary glaucoma in the right eye. He was hospitalized for two weeks, and vigorous treatment of the uveitis was instituted—removal of foci (tonsils), foreign protein, atropin, heat, and so forth. The tension came down and stayed down, but the vitreous remained very cloudy (V. 20/200) and Descemet's deposits continued. On March 12, 1937, he was given a transfusion of 300 c.c. of whole blood, with no reaction. On March 17th, the patient thought he was better and a note was made that the vitreous looked clearer, opacities were clumped, and a good view of the optic disc and choroidal lesion was possible. Vision was 15/50. On March 24th, vision was 20/50 with the pinhole; on April 20th, it was 20/40. On May 19th, vision was 20/100—a few scattered deposits on Descemet's membrane were noted, and the vitreous was no clearer. Since then, the vitreous has cleared steadily, and the vision on September 15th was 20/30—. I am not convinced that the recovery in this case has been hastened or influenced by the transfusion, for it has seemed to behave as such cases usually do.

Sympathetic ophthalmia. Inspired by the prevailing Russian enthusiasm for transfusion, and in particular by V. N. Archangelsky's reported success in treating vitreous exudates by this method, P. F. Archangelsky of Tashkent employed transfusion in two cases of sympathetic ophthalmia.[11]

Case 1. A 28-year-old male had suffered a severe injury to the left eye (a blow from a stick) at the age of 7 years, which necessitated enucleation six months later. The vision of the right eye had become impaired three months after the enucleation. On admission to the clinic, March 3, 1935, vision was 0.4; there were deposits on Descemet's membrane; the iris was muddy, the pupil small and adherent, and the ophthalmoscope gave only a hazy view of the fundus with a suggestion of pallor of the optic disc; the intraocular tension was 49 mm. Hg. A diagnosis of sympathetic ophthalmia was made, and vigorous general and local treatment was instituted.

By March 27th, there had been no improvement, and tenotomy of all four rectus muscles was performed. The tension was 36 mm. Hg on March 28th, and 41 mm. on April 4th. Between April 7th and May 4th, four small transfusions were given (from 100 to 150 c.c. of blood each time), after two of which there was slight general reaction. The tension gradually

fell to 30 (May 17th) and the vision improved to 0.7 with correction (April 28th). The iris became clear. A month after discharge the patient reported continued good vision.

Case 2. A 30-year-old male had suffered a severe injury to the right eye (a blow from a stick) at the age of 14; the eye had become blind 7 weeks later and became atrophic in 1917-1918. At the age of 23 years, the vision of the left eye had begun to fail; when Dr. Filatov saw the patient the vision was reduced to perception of light. A diagnosis of sympathetic ophthalmia was made and the right eye was enucleated on January 13, 1929. After 3½ months of vigorous treatment with foreign protein, mercury, salicylates, and so forth, the patient was discharged with normal vision.

In 1930, two attacks of "sympathetic ophthalmia" were treated in Nikolayeff, and in 1935 another attack was treated in Tashauze. A relapse after this last attack caused the patient's admission to the Tashauze Clinic on March 3, 1935, at which time the vision was 0.2, there was ciliary injection, the iris was "muddy," the pupil was irregular, with iris pigment on the anterior lens capsule, and there were diffuse and flocculent vitreous opacities. Intensive general and local therapy was instituted, and on March 27th the vision was 0.8 and the vitreous opacities were smaller and less dense.

Transfusions were given on March 28th (100 c.c.), April 2d (150 c.c.), and April 23d (100 c.c.). After the second transfusion there was a slight general reaction, and after the third transfusion there was a severe reaction requiring the administration of stimulants. There was gradual subsidence of the inflammatory signs, the iris became clearer, and the diffuse vitreous haze lessened through clumping of the scattered fine opacities into larger flocculi; the latter finally broke up into a number of smaller particles floating in an otherwise clear vitreous, allowing an unobstructed view of the fundus. The vision steadily improved until on May 19, 1935, it was 1.5.

Comment. In these two cases of iridocyclitis where established therapeutic measures had caused only moderate improvement, rapid subsidence of inflammatory symptoms and clinical recovery occurred following repeated small transfusions. The behavior of the turbid vitreous in the second case is very similar to the reaction of the vitreous after transfusion in the aforementioned cases of V. N. Archangelsky.

One is astonished to note the indifference with which several posttransfusional reactions are mentioned. Indeed, P. F. Archangelsky suggests that possibly these reactions were in some way responsible for the happy result, as in the case of nonspecific-foreign-protein shock therapy. It is possible that the severe reaction occurring in the second case was due to sensitization from the previous transfusions three and four weeks previously. A reaction due to incompatability of the donor's blood may have far-reaching consequences in serious kidney damage; it would seem infinitely safer to achieve a foreign-protein effect, if this is desired, by using one of the substances commonly employed for this purpose.

Anterior uveitis. At a meeting of the Vienna Ophthalmological Society on November 19, 1934, Josef Urbanek reported a case of severe iritis with hypopyon in which all customary therapeutic measures had proved ineffectual. As a last resort a blood transfusion was given, with prompt subsidence of the inflammatory process and rapid healing.

TROPHIC LESIONS

Lattice keratitis. The following interesting case has not previously been re-

ported and it is, therefore, cited in some detail.

A. C. P., a 42-year-old male, first consulted the late Dr. E. S. Thomson* on February 4, 1920. He gave a history of attacks of keratitis in the left eye of a few days' duration at irregular intervals since December, 1913. His father had lost his vision from what seems to have been an obscure type of superficial keratitis, and a paternal great-uncle had apparently been similarly affected.

Examination showed an unusual form of superficial keratitis in the left eye, with crossing and interlacing gray lines and fissures, some of which stained with fluorescein. Vision was 10/200. A diagnosis of lattice keratitis was made. The right eye was normal, with corrected vision of 20/15.

The general examination was negative; smears, cultures, and scrapings from the cornea were all negative. Treatment consisted of hot compresses, atropine, dionin, yellow oxide, cauterization with phenol, and other remedies. The condition responded slowly and was not pronounced "healed" until May 21, 1920, at which time the vision of the left eye was 20/50—, with correction.

On November 5, 1920, the lesion of the cornea was again active with a "crack" that stained with fluorescein. A small ulcer developed which was finally healed January 12, 1921, leaving vision of 20/50—. Later that spring the patient had another slight attack of photophobia and infiltration around the corneal "lines," but no break in the epithelium developed.

He was seen again in May, 1922, in March, 1923, in June, 1923, and in July, 1924. There had been several slight attacks similar to the one just described, without epithelial erosion, and the vision had gradually fallen, through increase in the corneal opacity, to 18/200.

On March 15, 1926, a superficial ulcer developed in the left cornea. Despite energetic local and general treatment, the ulcer remained sluggish and showed no disposition to healing. On April 14, 1926, at the suggestion of Dr. Henry Stuart Patterson, a transfusion of 500 c.c. of whole blood was given by the multiple-syringe method. The eye began to whiten and the ulcer to heal at once. Encouraged by this response, another transfusion was given on May 5th, and on May 11th, the ulcer was pronounced "healed."

There were no more serious attacks until December 3, 1930, at which time a small active lesion was found for the first time in the right cornea. Corrected vision was 20/15 in the right eye, 20/200 in the left. There was no corneal anesthesia. A transfusion was given on December 5th, with immediate improvement in objective and subjective signs. Slitlamp examination on December 11th suggested that the process was entirely in the epithelium. Corneal culture was negative. The basal metabolism was normal.

On December 16, 1930, Dr. deSchweinitz saw the patient and agreed with the diagnosis of "lattice keratitis."

During December, tuberculin therapy was instituted, but was discontinued after three doses because the patient was confined to his bed with a mild case of typhoid. On January 31, 1931, a mild attack occurred in the left eye; a transfusion was given on February 5th, and the lesion was pronounced healed on February 11, 1931.

There was no further activity in either eye until November 9, 1933. At this time corrected vision was 20/20 O.D., the ability to detect shadows O.S. The cornea

* The author's association with this case, with Dr. Thomson, began in 1924, and has continued since Dr. Thomson's death on January 12, 1931.

of the left eye showed a linear erosion in the old opacity, staining with fluorescein. During the next few days the lesion extended. A transfusion was given on November 13, 1933, with immediate lessening of the congestion, photophobia, and lacrimation—the "break" in the corneal surface began to diminish in area and epithelization was complete within two weeks.

The next, and latest, attack occurred in January, 1935, and involved the right eye. Two or three cracks appeared in the corneal epithelium at the site of the previous lesion (December, 1930), staining with fluorescein. Vision with correction was 20/20—. A transfusion was given on January 28, 1935, and again there was immediate improvement in the objective and subjective signs—less congestion, less photophobia and lacrimation, less feeling of "scratching," and diminution of the staining area. Before the lesion was entirely covered in with epithelium, the stimulating effect of the transfusion seemed to wear off. The healing process having apparently come to a halt, another transfusion was given on February 11th and on February 18th note was made that the lesion was "nearly well." However, on February 21st, the staining area was more definite and several other (nonstaining) gray spots were noted in the cornea. Another transfusion was given on February 22, 1935, and on February 25th the epithelization was practically complete. On March 2, 1935, the vision with glasses (under atropine) was 20/20— and the lesion no longer stained with fluorescein. A slight relapse (fluorescein staining) occurred on March 5, 1935; transfusion was performed on March 6th, and healing was complete on March 8, 1935.

Dr. Wilmer saw this patient on March 13, 1935, at which time there was no evidence of keratitic activity in either eye. Dr. Wilmer suggested an intradermal tuberculin test, which was strongly positive.

There have been no subsequent attacks. Vision on October 21, 1936, was 20/30 O.D., 20/200 O.S., with correction. The patient is carrying on his occupation as a lawyer.

Summary. This patient was suffering from an obscure, probably familial, relapsing form of superficial keratitis in both eyes. Drs. Thomson, deSchweinitz, and Wilmer concurred in the diagnosis of lattice keratitis. The intradermal tuberculin test was strongly positive (after a short course of tuberculin therapy had been used). When the corneal lesions became active after intervals of quiescence, healing was very sluggish and was uninfluenced by customary local and general therapeutic measures. The use of transfusion was found to cause immediate arrest of the pathological process with relief of subjective symptoms and stimulation of healing. Since April, 1926, each attack has been terminated by the use of transfusion (500 c.c. of whole blood each time). Prior to that date the transparency of the cornea of the left eye had been destroyed. There have been two attacks involving the right eye, but the pupillary area has not been invaded and 20/30 vision has been retained.

Comment. As to the etiology of this lesion there has been, and will continue to be, endless discussion. There seems to be no doubt that it is a nutritional or trophic disturbance.

The repeatedly demonstrated spectacular effect of transfusion in this case clearly suggests that it be tried in the treatment of the acute phases of chronic or indolent eye lesions where ordinary measures have proved ineffectual—particularly in trophic disturbances of the

anterior segment such as lattice or nodular keratitis, dendritic or herpetiform keratitis, neurotrophic keratitis, keratomalacia, recurring bullous keratitis, Mooren's ulcer, and allied conditions. It is not intended to imply that transfusion can cure the underlying (unknown) factor in these conditions, or clear the corneal opacities, or even stop the tendency to periodic recurrence. It is suggested, however, that transfusion may stimulate the reparative processes to such an extent that cessation of activity will occur, with recession and healing. Photophobia and lacrimation will be abolished, and ciliary injection will fade out; in cases with denuded corneal areas, the staining areas will become smaller and will ultimately become epithelized.

I have recently had the opportunity of trying the effect of transfusion in another trophic lesion of the cornea.

G. F., a male, 61 years of age, suffered from a mild attack of dendritic keratitis in the right eye in December, 1933, which lasted about a month.

He was seen again on September 7, 1937, with a severe case of dendritic keratitis in the same eye. The cornea was deeply infiltrated and stained with fluorescein in a number of spots. The usual active local treatment was instituted without any visible effect. After 32 days without improvement, he entered St. Luke's Hospital on October 9, 1937, and received a transfusion of 300 c.c. of whole blood. There was no reaction and the patient reported two days later that the eye was comfortable; it was perfectly white and free from photophobia and lacrimation—the area staining with fluorescein was about one fourth the size it had previously been. On October 14th, there was further improvement, staining persisted only in one pin-point-sized area, and it has since healed.

Convalescent blood for herpes zoster. Trygve Gundersen[12] in 1935 reported a series of cases of keratitis and uveitis in herpes zoster, in which definite improvement followed transfusion with whole blood from patients who had recovered from herpes zoster.

Seven patients had nine such transfusions, the amount of blood varying from 300 c.c. to 500 c.c.; all had relief from pain and subsidence of symptoms following the transfusion, and in most cases this relief was prompt and marked. In only one of these patients was there a loss of useful vision, whereas in 13 out of 19 untreated control cases, there was serious visual impairment. Gundersen concluded that transfusion of whole convalescent blood is of marked benefit in the treatment of herpes zoster ophthalmicus if instituted before the fifth day following vesiculation. He found that it had no effect on a well-established uveitis due to herpes zoster, although it may prevent the development of new uveal foci of infection.

Comment. In the light of the author's experience with transfusion in a trophic corneal lesion, it would be interesting to try the effect in herpes zoster of transfusion from a matching donor who had not had herpes. A favorable influence on the pathological process would suggest one of several hypotheses: (1) the benefit in Gundersen's cases came from the stimulating effect of the newly introduced blood and was not a specific immuno-reaction from convalescent blood; (2) the average healthy donor has in his blood substances (call them immune bodies) which protect him against the herpes-zoster virus and which exercise a healing effect upon the herpetic lesions of the host after transfusion.

Complications

In a previous paragraph the use of transfusion in arresting retinal hemor-

rhage (blood dyscrasias, eclampsia, and others) was described. Paradoxically, retinal hemorrhage also occurs as practically the only ocular complication of transfusion.

G. A. Schaly[13] in 1926 reported four cases of retinal hemorrhage following transfusion for pernicious anemia (two cases) and aplastic anemia (two cases). Impairment of vision came on shortly after the transfusion. The ophthalmoscope revealed fresh retinal and preretinal hemorrhages. Two patients died; vision was not restored to the two who lived.

In 1930-31, H. C. Messinger and A. W. Eckstein[14] examined the eyegrounds of 60 consecutive recipients before and immediately after transfusion, and in 10 cases found fresh retinal hemorrhages 12 to 24 hours after the transfusion. In only two of these cases was the patient conscious of any visual disturbance, and in one instance, small retinal hemorrhages had been present before the transfusion. The more serious retinal hemorrhages had occurred in patients suffering from blood dyscrasias. There were six such diagnoses in the entire series of 60 and five of the retinal hemorrhages occurred in this group. One hemorrhage occurred in a patient with retinal arteriosclerosis, and the other four in patients with profound secondary anemia of more than three weeks' duration.

Other similar cases have occasionally been reported.[15]

At the Queens General Hospital this year, I have been called in consultation to see several cases of leukemia and pernicious anemia with massive retinal hemorrhages discovered following transfusion. Routine ophthalmoscopic examinations had shown no such intraocular bleeding before these transfusions had been given, and there was some debate as to whether the transfusions or the disease were primarily responsible.

Comment. The occurrence of retinal hemorrhage after transfusion may be due to faulty technique: (1) Incompatibility of the donor's blood may be manifested by generalized petechial hemorrhages and icterus, coming on from a few hours to several days afterward; if death ensues, autopsy usually confirms an *ante mortem* diagnosis of hemorrhagic nephritis. (2) Emboli may lodge in the finer retinal arterioles and capillaries with resultant extravasation of blood.

Assuming no errors in technique, retinal hemorrhage may result from the increased blood volume and slightly increased blood pressure caused by the transfusion. The overloading of the circulation by the injudicious introduction of a large volume of transfused blood and saline solution has more than once caused pulmonary edema. If transfusion is to be done to improve the quality of the recipient's blood (as in the various dyscrasias) the advisability of performing a preliminary phlebotomy must be considered.

Conclusions

The foregoing pages have been largely concerned with clinical observations. May we draw any general conclusions from them? The value of transfusion in arresting hemorrhage or replacing massive blood loss (and thereby preventing amaurosis) seems to be unquestioned and may be dismissed. The possible value of transfusion in inflammatory eye lesions has not been conclusively demonstrated and needs further investigation. In stimulating healing in trophic eye lesions, transfusion seems to have its most definite therapeutic effect, but the stimulation is not long sustained, and unless healing takes place in a week, transfusion must be repeated or the lesion may again relapse into its previous sluggish state.

There has never been a wholly satisfactory explanation of the beneficial effect of transfusion on local pathological processes. However, since it seems to be the fashion of the day to adduce a theory, we may assume that at all times in every healthy living organism there is either equilibrium between processes of destruction and repair, or excess of the latter; that although poisons, toxins, and germs are constantly entering the system, they are also constantly being neutralized, eliminated, destroyed; that in illness these inimical influences are temporarily in the ascendency; that anything which restores the balance of power to the processes of repair will be curative. This may be accomplished negatively by specific drugs, or by eliminating foci of infection; or positively by stimulating the reparative processes by a host of hygienic and therapeutic measures, of which transfusion is but one. Recovery after removal of one abscessed tooth does not indicate that this was the only focus of septic absorption; the disturbed balance between repair and destruction might just as well have been restored by removal of tonsils, or colonic irrigations, on the one hand, or by transfusion, foreign protein, or heliotherapy, on the other. In transfusion, therefore, we have a splendid nonspecific therapeutic reinforcement.

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THE GENESIS OF THE CYCLITIC MEMBRANE

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The efficiency of the human eye is due in no minor degree to the integrity of the ciliary body. Because it is completely hidden from all ordinary clinical observation, this structure escapes the attention of the ophthalmologist. Unfortunately, it is only by the study of enucleated eyes that conditions in and on the ciliary body can be determined, although clinically we can frequently infer what is taking place from the nature of the precipitates in the aqueous or the inflammatory cells in the anterior vitreous.

The formation of cyclitic membranes from the inner free surface of the ciliary body occurs only in chronic inflammatory processes. Irritants causing acute inflammation with the production of polymorphonuclear leucocytes are intensive enough to lead to degeneration or necrosis of tissue. It is these chemical products of cellular disintegration that act upon the leucocytes in the adjacent capillaries of the blood and induce their emigration through the vessel walls. The irritants of acute inflammation cause the infiltration of leucocytes within the ciliary body, particularly in its vascular layer, and the exudation of leucocytes and fibrin on the inner, free surface of the ciliary body or in the anterior part of the vitreous. Such irritants are never productive nor proliferative in their action and therefore cannot develop the formation of connective-tissue membranes. Chronic inflammations on the other hand are due to irritants of less intensity which may even act as stimulants and therefore can develop productive and proliferative changes or the formation of true connective-tissue membranes. Chronic inflammation may arise either after an acute inflammation has subsided, leaving a weakened irritant in the tissue, or the inflammation may be chronic from the beginning, due to an irritant of low intensity.

Inflammations of the ciliary body may occur from ectogenous or endogenous causes. In both cases E. Fuchs[1] stated that the essential factor is the deposit of bacterial or other toxins in the posterior chamber or in the anterior part of the vitreous. From chemotactic action exerted at the latter places there occur in all the varying types of cyclitis, the infiltration of cells within the ciliary body, and the exudation of cells on its inner free surface. The infiltration of inflammatory cells inside the ciliary body is located chiefly in the innerlying vascular lamina or basic layer (H. Virchow).

In the most intensive forms of acute or septic endophthalmitis, when the eye is removed in the florid stage, the principal anatomic finding is a thick layer of dense numbers of polymorphonuclear leucocytes along the inner, free surface of both the coronary and orbicular portion of the ciliary body. These cells frequently lie within extensive networks of fibrin. Although the source of this exudate of leucocytes and fibrin is obviously the vascular layer of the ciliary body including the stroma of the ciliary processes, nevertheless we may find only scant numbers of pus cells within the ciliary body. The reason for this is undoubtedly the tendency of phagocytic cells to emigrate rapidly from their source and

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travel toward the irritant that has brought them forth from the blood vessels.

In the later stages of acute inflammation, or in cases in which chronic inflammation has existed from the beginning, the prevailing cell on the inner free surfact of the ciliary body is the large phagocytic cell or macrophage. Inside the ciliary body no inflammatory cells may be present, or varying densities of small lymphocytes and phasma cells may occur. It is, therefore, of considerable importance, in differentiating anatomically between acute and chronic inflammatory processes in the ciliary body, to note whether the small microphage—the ordinary polymorphonuclear leucocyte or the macrophage may be present as the exudative product in the adjacent vitreous.

Since, in the formation of the cyclitic membrane, the macrophage cell is the most important element, it is necessary to review in brief the origin and characteristics of this cell. E. Metchnikoff[2] was the first to employ the generic term macrophage to designate the mononuclear phagocyte. At that time he pointed out that the macrophage is a characteristic element of chronic inflammation. He recognized the great resemblance between the macrophage cell of the blood or the mononuclear leucocyte and certain fixed elements of the connective tissue as well as cells of the splenic pulp, Kupffer's endothelial cells of the hepatic capillaries, and endothelial cells in general. The principal characteristics of all phagocytic cells were described by this great pioneer as being their marked chemotactic and physiotactic sensibility, causing them to migrate easily, their ameboid movements and ability to take up and to digest various foreign bodies. During 1892 to 1901, E. Metchnikoff[3] delineated the locus and essential functions of the reticulo-endothelial system. E. L. Opie[4] stated that in inflammation the blood serum and the phagocytic cells coöperate. Exuded serum at the site of inflammation possesses bactericidal qualities, and probably, through agglutination and precipitation, has a part in fixing and destroying the inflammatory irritant. The ability of phagocytic cells to remove injurious material is dependent on the possession of proteolytic enzymes. The mononuclear phagocytes contain an enzyme which, like pepsin, digests in the presence of acid. L. Aschoff,[5] from the results of his experiments with Kiyono, defined the range of the reticular and endothelial system of phagocytes as including the endothelial cells of the lymph-node sinuses, those of the capillaries of the spleen, liver, and bone-marrow together with the phagotytic cell of the connective tissue, designated by this author as the histiocyte. William Boyd[6] states that the macrophages of the exudate are derived from two main sources: (1) the histiocytes or wandering cells of the tissues, and (2) to a much less extent, from the monocytes or large mononuclears of the blood. The latter are probably detached from the endothelial lining of the sinusoids of the liver, spleen, lymph nodes, and the bone-marrow.

The essential factor in the formation of the cyclitic membrane is the conversion of the macrophage into a connective-tissue cell or fibroblast. Since the cyclitic membrane is composed of connective tissue, the source of its productive cells must be considered. The fibroblasts within the ciliary body are fixed tissue cells. It is not possible for them to proliferate through the unbroken pigmented and unpigmented ciliary epithelia.

In the enucleated eyeball in which cyclitis is in the chronic stage, steps in the

beginning of connective-tissue formation at the inner surface of the ciliary body can often be studied. The eyes that recover from chronic inflammation, of course, never exhibit any production of connective tissue in the vitreous adjacent to the ciliary body. In the latter case, resolution or the disappearance of all infiltrates and exudates takes place. The macrophages do not congregate in sufficient numbers to initiate fibrosis. According to the findings of A. Carroll[7] it is the decomposition products of the macrophages or trephones that stimulate the fibroblasts to proliferate.

Since only the genesis of the process is being considered here, the following descriptions of histopathologic findings in the writer's cases will be brief. Although a cyclitic membrane may arise from any part of the inner surface of the ciliary body, by far the best place to study its incipient stages is the pars plana or orbiculus ciliaris. It has been noted that generally few macrophages are present within the ciliary body. In chronic cyclitis, on the other hand, macrophages can frequently be noted lying between the epithelial cells of the unpigmented lining layer (fig. 1, case 1115).

A young man of 21 years, a patient of the Washington University Eye Clinic, had suffered a deep penetrating injury through the cornea from glass four years previously. The vision immediately following the accident was light perception. Before the enucleation, recurring attacks of inflammation and pain in the eye had been frequent. Anatomically, there were observed a secondary glaucoma and an intense degree of infiltration of the iris and ciliary body with small lymphocytes and plasma cells. The unpigmented ciliary epithelial cells in the posterior part of the pars plana present a somewhat uniform cystic degeneration and long whip-like inner processes. On the temporal side, macrophages were easily observed to lie between the unpigmented epithelial cells and their elongated inner processes. Between the latter processes and to the inner surface of the epithelial layer some

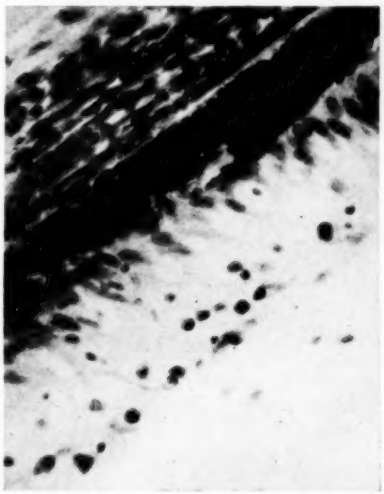

Fig. 1 (Lamb). Case 1115. Section through part of a chronically inflamed ciliary body showing macrophages emigrating through the unpigmented ciliary epithelium.

typical macrophages could be studied. A circular or slightly oval mass of light-staining cytoplasm inclosed, frequently eccentrically, a relatively large, moderately dark-colored nucleus of round or slightly oval contour. To the inner surface of the epithelial layer, a few macrophages had been converted into young connective-tissue cells or fibroblasts. The latter change however can be studied better in the next eye.

Case 1906 (figs. 2, 3, and 4). A woman, aged 47 years, a patient of Dr. Lawrence T. Post, sustained a deep penetrating injury through the cornea, four months before enucleation. A chronic iridocyclitis with secondary glaucoma destroyed all hope of saving the eye. Anatomic examination confirmed the clinical

findings. The iris and ciliary body were moderately infiltrated with small lymphocytes and plasma cells. To the inner side of the orbiculus ciliaris, steps in the transformation of macrophages to fibroblasts could be observed. The cytoplasm of the macrophages and fibroblasts was well preserved in this case, so that changes in the shape of the entire cell were easily visible. What is not generally found, also, is that many of the fibroblasts here presented a flat or surface view. This was valuable, since developed fibroblasts are thin, disc-shaped structures. The somewhat commonly described sickle and kidney shapes of the nuclei of the macrophages were frequently encountered. It was not uncommon for the macrophages and the newly formed fibroblasts to contain a few grains of melanin.

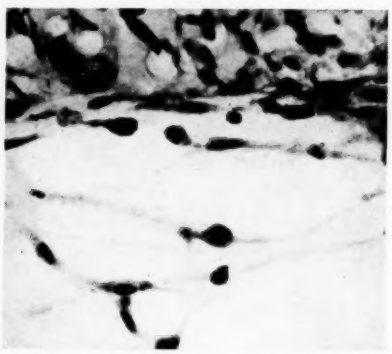

Fig. 2 (Lamb). Case 1906. Section through, above, part of unpigmented ciliary epithelium, and below, macrophages throwing out processes preliminary to becoming fibroblasts.

Fig. 3 (Lamb). Case 1906. Section through, above, part of unpigmented ciliary epithelium, and below, macrophages in process of conversion into fibroblasts.

In figure 2, case 1906, a few macrophages with their relatively dark-staining nuclei can be observed making their way between the unpigmented ciliary epithelial cells; the nuclei of the latter are light staining. The unpigmented ciliary epithelium here presents considerable hyperplasia and cystic degeneration over the pars plana. Just internal to the ciliary epithelium, the first changes of macrophages to fibroblasts are visible. The cell body and nucleus of the macrophage elongate. The nucleus at first remains dark staining but the cytoplasm stains

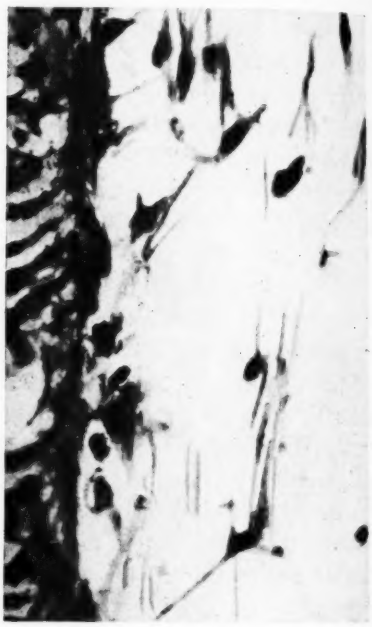

Fig. 4 (Lamb). Case 1906. Section through part of unpigmented ciliary epithelium and adjacent fibroblasts developed from macrophages.

lighter. With the elongation of the cell body there early occurs, as observed on surface view, the development of cell processes. These may be long and thin or broad and short. In figure 3, case 1906, a farther advance is seen. The nuclei are now lighter staining, and the processes are generally longer and pointed or wing-shaped. The long axes of the fibroblasts, as a rule, become arranged parallel to the zonular or suspensory lens fibers. In figure 4, case 1906, surface views are observed of well-developed fibroblasts with light-staining cytoplasm and nucleus. The nucleus may contain one to several nucleoli and show a folding of its covering membrane. On longitudinal section, fibroblasts appear thin, elongated, and spindle-shaped.

In figure 5, case 1970, the usual picture of young, elongated fibroblasts along the inner surface of the ciliary body is seen. The case is that of a man of 28 years, and is, again, one of chronic uveitis due to a penetrating injury of the cornea with a piece of metal five weeks previously. To one side there is present a small group of macrophages. Several of the latter have taken up numerous grains of melanin. On the same side, over the posterior part of the orbiculus ciliaris, lies a layer of loose connective tissue infiltrated with macrophages. One gets a definite impression that around circular tubelike spaces in this tissue the macrophages arrange themselves to build the endothelial lining.

In numerous other eyes of the collection with chronic cyclitis after penetrating wounds, the formation of fibroblasts from macrophages along the free surface of the ciliary body could be observed. With fibroblasts formed, collagenous fibers and connective tissue readily follow, being particularly aided by the well-known mitotic division of the fibroblasts themselves.

A. Carrel[8] writes there is nothing new in discovering that fibroblasts can develop from macrophages. This author states that J. Renaut[9] reported this transformation. Carrel also refers to A. Maximow's[10] findings, in which cultures of peritoneal macrophages underwent differentiation and yielded colonies of fibroblasts. Carrel, in his report, describes the conversion of large mononuclear leucocytes from adult chickens into fibroblasts in a culture medium of only chick plasma or combinations of chick plasma, chick embryo juice, and Tyrode's solution. Sometimes 20-percent fibrinogen suspension was substituted for the plasma.

Fig. 5 (Lamb). Case 1970. Section through newly formed fibroblasts in profile infiltrated with a few macrophages. Some of the latter, in a group below and to the right, have taken up particles of melanin.

J. de Haan[11] also describes mononuclear wandering cells changing into fibroblasts when cultured in a constantly flowing medium.

Lastly, A. Maximow[12] states that in the later stages of inflammation, when scar tissue is formed, many of the resting polyblasts or macrophages are transformed into fibroblasts.

A. Alt[13] writes that the retinal portion

of the ciliary body frequently takes an active part in the formation of the cyclitic membrane. The cylindrical cells of this layer proliferate and begin to grow out into long, spindle-shaped cells and finally into long connective-tissue fibers. On the other hand, J. H. Parsons[14] states that

Fig. 6 (Lamb). Case 1167. Section through posterior part of ciliary body, showing proliferation of pigmented ciliary epithelium into long, fingerlike and stringlike processes with newly formed connective tissue along their sides.

there is not sufficient evidence that the cubical cells of the retinal epithelium contribute to the formation of fibrous tissue. They are often dragged out and appear cylindrical. E. Fuchs,[15] in a paper on proliferations and tumors of the ciliary epithelia, voices the same opinion as Parsons.

There can be little doubt that the unpigmented ciliary epithelium takes no part in the production of connective tissue. Its proliferation and cystic degeneration, occurring predominantly in the posterior part of the pars plana, frequently produces the same appearance that is seen in the retina when cystic degeneration and proliferation of the neuroglial cells prevail. In case 2090, this resemblance between the proliferated unpigmented ciliary epithelium and the adjoining degenerated retina is seen. This case is one of pseudoglioma in a boy, four years old, a patient of Dr. Ray Mercer. The retina, diffusely infiltrated with edematous and albuminous fluids, is completely detached.

On the other hand, the pigmented ciliary epithelial cells can under certain conditions change to fibroblasts and develop connective tissue. This process was discussed by the writer in a previous paper.[16] Nevertheless, it rarely plays any part in the formation of a cyclitic membrane, principally because the unpigmented epithelium generally lies internal to any connective tissue formed from the pigmented epithelial cells of the ciliary body. This is demonstrated in figure 6, case 1167. The patient, aged 43 years, had suffered with trachoma of both eyes since he was two years old. Both eyeballs were much shrunken at the time, and Dr. M. H. Post removed the totally blind left eye because of uncontrollable pain. On one side, over the orbiculus ciliaris, the unpigmented ciliary epithelium was detached far inward (toward the interior of the eyeball). Under this detached unpigmented layer of epithelium, the pigmented ciliary epithelium had proliferated in a high degree. Fingerlike processes of pigmented cells extending posteriorly and inward are closely bordered by newformed connective tissue, particularly toward their distal ends. This connective tissue stained red with the acid fuchsin of van Gieson's stain. At the posterior internal angle of the triangular space left by the detached unpigmented ciliary epithelium, this connective tissue became denser and a spicule of bone had been produced.

Summary

The characteristic cell of the exudate on the free surface of the ciliary body in

chronic cyclitis is the macrophage. The conversion of macrophages into fibroblasts or connective-tissue cells is described and illustrated in a case in which the fibroblasts have been sectioned on the flat. This occurrence in the vitreous adjacent to the ciliary body is the earliest stage in the development of the cyclitic membrane. Neither layer of the ciliary epithelia or retinal part of the ciliary body participates in the formation of the cyclitic membrane, although the pigmented epithelial cells can, under certain conditions, change into connective-tissue cells.

The transformation of macrophages into fibroblasts is not a newly discovered process, having been observed in tissue cultures by Carrel, Maximow, and de Haan.

The sections and illustrations used in this paper were prepared in the Laboratory for Ophthalmic Pathology, Washington University School of Medicine.

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DIVERGENCE INSUFFICIENCY: A CLINICAL STUDY*

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Anomalies of the convergence-accommodative mechanism have long been recognized as a source of ocular discomfort. The importance of pathologic divergence, particularly divergence insufficiency, has not been excessively stressed. In our experience, divergence insufficiency is a definite clinical entity which causes much asthenopia. It also appears to be amenable to treatment.

Divergence insufficiency is distinguished from other types of esophoria by the fact that in the former condition the esophoria is greater in distance vision than it is in near vision, and the power of divergence or abduction is definitely less than normal. These cases may be further divided into those in which there are insufficiency, paresis, and paralysis, the differentiation here being more a matter of the degree of severity, clinically, of the divergence difficulty. A similar classification is used clinically to describe various degrees of accommodative weakness. Embarrassment of divergence varies from a low-grade insufficiency to an actual paralysis of the function.

Dunphy and Dunnington[7] reported cases of divergence paralysis and also mentioned cases reported by Parinaud, Theobald, Duane, Holden, Cutler, Wheeler, Alger, and Zentmayer. Stokes reported five cases, in two of which the patients were sisters.

The typical findings in divergence paralysis are the presence of an homonymous diplopia in all fields of distant vision but not in near vision, normal ocular excursions, and a loss of diverging power. Convergence is unaffected. If these cases are to be accepted as cases of divergence paralysis, one must assume the existence of a center for divergence similar to the accepted center for convergence in Perlia's nucleus. Bielschowsky was of the opinion that a divergence innervation is required not only to change the visual lines from convergence into parallelism, but also to overcome an esophoria. He said that vergence tests tend to prove this. Duane also believed that such a center existed in the vicinity of the nucleus of the sixth cranial nerve. Bergman, Pugh, and Duke-Elder believed that divergence is accomplished by relaxation of convergence through reciprocal innervation. Maddox assumed that divergence paralysis occurs. Riley held that a center for divergence can be suspected on clinical grounds, although its anatomic site is as yet unknown. Bruce postulated a center for divergence, situated probably in the midline, separate from but adjacent to and posterior to the abducens nucleus. As suggested by Bielschowsky, it would seem difficult to conceive why only convergence should lack an antagonistic innervation. It seems that there must be a definite center for divergence in order to carry out the refined control which is exhibited clinically over the all-important convergence-divergence relationship. This is so carefully balanced a function

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that its operation by a one-sided control —that is, by convergence only—is difficult to visualize.

Cases of divergence insufficiency were reported by Dunnington,[8] Davis, Peter, Maddox, Pugh, and Bielschowsky. These authors pointed out the discomfort caused by the condition, the association of physical and psychic disturbances, the exaggeration of the condition by presbyopia, the lack of response to orthoptic measures, and the possibilities for relief by the use of prisms, base out. On the last point, opinion was divided. Operation was advised in cases in which the condition did not respond to other types of treatment.

In diagnosing insufficiency of divergence, it is first noticed that the eyes show an esophoria both in distance and in near vision. It is further observed that the esophoria is definitely greater in distance vision than it is in near vision. When readings of vergence are taken, it is seen that divergence is well below normal, whereas convergence is normal or above. If one determines the rest position, or phoria, slowly, thus fatiguing binocular fixation, when the cells of the phorometer or trial frame are cleared, and preparatory to taking readings of vergence, and the eyes fixate the light at 6 meters, they will often exhibit an homonymous diplopia, which at once will show their deficient diverging power. This diplopia may disappear quickly on resumption of binocular fixation, but it will usually reappear as one proceeds to fatigue divergence by repeated tests of ability to overcome prism, base in. Such eyes may overcome 4 to 5 diopters of prism, base in, at first, but as the test is prolonged this amount quickly drops to 0 or 1 or 2 diopters of prism, base in. As the diplopia is elicited in this manner by fatigue, it will often be found that a prism, base out, of from 2 to 6 diopters, is required in order to maintain single vision at 6 meters. And this, incidentally, is a good way to determine how much prism, base out, is needed for distance use. Convergence, being unopposed, is usually high, between 20 and 30 prism diopters. When readings of vergence are taken in near fixation, the same relations are found, but we have come to regard divergence as a significant finding for distance fixation only, and to regard convergence as a significant finding for near fixation only. In other words, divergence is typically a function of distance vision and should be so measured, and convergence should be measured for near vision. In our experience the phenomenon of homonymous diplopia on fatigue of fixation has not been found frequently in near vision. In the cases of divergence paralysis, homonymous diplopia for distance is, of course, a constant finding.

In a typical case of divergence insufficiency (case 52 in our series), when the ametropia was corrected there was an esophoria of 10 prism diopters at 6 meters and of 5 prism diopters at 0.33 meter. Divergence at 6 meters was 1 to 2 prism diopters, whereas convergence at 0.33 meter was 25 prism diopters. There was also a left hyperphoria of 3½ prism diopters for both distance and near vision. When fixation was fatigued at 6 meters, homonymous diplopia was elicited and 5 diopters of prism, base out, was required to maintain single vision. Inasmuch as this corresponded to the amount of esophoria found in near vision, 5 diopters of prism, base out, was prescribed to be worn constantly together with 3½ diopters of vertical prism. The eyes were hyperopic and the patient was 31 years of age. He had had much difficulty with near work and had left college. With this correction he was greatly pleased, he returned to college, and graduated.

In this study we are reporting 54 cases

of esophoria in which an analysis of the findings seemed to indicate a divergence insufficiency. Thirty-seven of these were cases of frank divergence insufficiency, 10 exhibited functional esophoria, 4 were cases of paralysis of divergence, 2 were cases of paresis of divergence; 1 case of excessive convergence was included because relief was obtained by the use of prisms, base out. In all but 7 cases in this series the patients were between 20 and 45 years of age—the period of life when the greatest demand is made on the eyes for intensive close work. Among younger people there is less demand on the eyes and more reserve power, whereas elderly people are aided by presbyopic additions. As to sex, the patients were about equally divided: 25 were males and 29 were females. Occupation semed to play a definite rôle, as 34 patients were engaged in performing near work. Normal vision was found in all cases; no amblyopic eyes were observed. Accommodative power was low in 11 cases, and in 5 it was definitely subnormal. In 14 cases the patients were wearing glasses that afforded very deficient correction of the ametropia, this adding to the strain of an already defective ocular apparatus. Hyperphoria was seen in 34 cases; it was often of a changing and fluctuating type. It was found for distance only in 8 cases. The hyperphoria averaged 1 prism diopter and the most marked was 8 prism diopters. In one case the hyperphoria was 11 prism diopters for distance vision and 7 prism diopters for near vision; this appeared to be the primary difficulty, the divergence weakness being of secondary importance. Divergence averaged 2 to 4 prism diopters; it was 0 in 11 cases, although the condition seemed to be frankly paralytic in only 4 cases. In the paralytic group the patients complained of a persistent homonymous diplopia at a distance and in all fields of vision, but not in near vision. Convergence, as a rule, was more than 20 prism diopters. Hyperopia occurred in all but 10 cases, myopia was present in 8 cases, mixed astigmatism was present in 3, and antimetropia occurred in 1 case. Anisometropia, which was found in 26 cases, was a somewhat constant source of annoyance to these eyes. The esophoria recorded was from 3 to 18 prism diopters at 6 meters and from 2 to 10 prism diopters at 0.33 meter.

In 20 cases such functional derangements as chronic nervous exhaustion, functional disorders of the stomach, of the genito-urinary tract, biologic inferiority, asthenia, and menopausal disorders were present. Exophthalmic goiter was found in one case and migraine was present in two cases. In the cases in which paralysis occurred, vascular disease was found in one case, ovarian dysfunction in one, mental depression in one, and exophthalmic goiter in one case. From a neurologic point of view, 12 instances of psychopathic personalities were noted; 26 patients were neurasthenic in type, and 10 patients were obviously tense and high strung in their make-up. In several instances the onset of presbyopia aggravated the symptoms of the divergence weakness, which substantiates the observation of Davis.

The symptoms complained of were, for the most part, asthenopia associated with use of the eyes in near vision, fatigue, smarting, burning, and headaches. Some patients had difficulty in focusing the eyes on looking from near to far distances, and others felt as though their eyes were crossing and out of focus, or experienced eyestrain. Homonymous diplopia was present in 13 cases. Except in patients with paralysis and paresis, this diplopia was often fleeting and intermittent in character, and was observed most frequently in distance vision. In about half of these cases the diplopia could be in-

duced in near vision with fatigue of binocular fixation. It was of interest that in practically all the cases of insufficiency the symptoms complained of were most marked in near vision, in spite of the fact that the anomaly is primarily one of distance vision. We believe this is logical, however, because much greater demand is made on the fixating mechanism of the eyes when they are doing near work. Hence, the symptoms of all forms of accommodative and muscular imbalances are exaggerated in near vision. The actual physical data, however, vary, of course, with the position of the eyes when measured. Phoria and diplopia in divergence anomalies are greater in distance vision, whereas in convergence anomalies they are greater in near vision.

Concerning the nature of divergence insufficiency and the pathologic changes involved, we can but theorize. It would appear that in this condition there is an essential and intrinsic defect of the fixating mechanism of the eyes. Whether it is congenital or acquired is an open question. In either event it seems to be found in association with other defects of the central nervous system and the eyes. Psychic and nervous instability and irritability were marked features in our series of cases. Anisometropia was observed in a high percentage of these cases, and anisometropic eyes are known for their instability and inherent irritability, especially when forced to do much near work. Hyperphoria was often seen and is frequently a source of ocular fatigue. Subnormal accommodation and beginning presbyopia were found frequently; these conditions naturally added to the difficulty already present. It is seen, therefore, that there is an association or combination of errors which go to make up an obvious and essentially defective mechanism for fixating the eyes. Therefore, given the presence of those defects of the central nervous system and the eyes, plus excessive demands on the eyes, it is not difficult to understand why the patient should have marked symptoms of asthenopia. Except for the cases of paralysis, we doubt very much if there is any definite cause for divergence insufficiency. It appears to be an essential defect which, when associated with these other factors, causes asthenopia.

In the treatment of divergence insufficiency, a careful diagnostic study is the first essential. So-called esophoria should be repeatedly checked, and the degrees of esophoria found in distance and near vision should be compared. When the esophoria is persistently greater for distance, divergence weakness should be suspected. Repeated readings of vergence, which show divergence is decreased and convergence is increased, in association with this type of esophoria, will confirm the diagnosis. If, in addition, homonymous diplopia is elicited in distance vision during vergence tests, the diagnosis is still more positive. When such diplopia requires prism, base out, to maintain single vision, the diagnosis is established. Refraction should be performed carefully, and the needs for balanced vision, distance and near, should be determined. It is well to appraise the mental, nervous, and physical status of the patient, for these factors frequently determine the ability of the patient to meet his demands successfully with any form of treatment. If these factors are not too unfavorable, we have found the outlook for successful treatment good, and *vice versa.*

In our series of 54 cases, in all but 9 we have prescribed prisms, base out, incorporated in the prescriptions for glasses. The amount of prism, base out, prescribed was determined, (1) by the minimal amount needed to maintain single vision and (2), in those cases in which no diplopia was found, we ordered the

approximate amount necessary to offset the esophoria present in near vision. This left the eyes still esophoric for distance. The average amount of base-out prism ordered was 4 prism diopters, the greatest being 8 prism diopters. The amount of prism was divided equally between the two eyes. In seven cases of hyperesophoria, a vertical prism was placed before one eye—usually the nondominant one—and the base-out prism was placed before the dominant eye. In our opinion this should have been done more frequently; in other words, we should have taken greater cognizance of existing hyperphoria, as it occurred frequently. We are aware of the general prejudice against the prescribing of prisms, base in and base out, but we can see no logical reason why they should not be prescribed when they are indicated, just as any other type of correcting lens is prescribed. That the patient becomes dependent on them or that the prisms have to be increased at times does not seem to be a valid excuse for failing to prescribe them when ocular comfort and visual efficiency demand them. It is true that they should be used in carefully selected cases. In our experience the use of a minimal amount of prism, base out, in cases of definite divergence weakness has proved most useful. In practically all of our cases only one pair of glasses, either single vision or bifocal, was ordered. By prescribing the minimal amount of prism, the same amount was used both for distance and near vision; this apparently was satisfactory.

In the functional esophorias, prolonged use of atropine proved beneficial. It did not, however, alter the esophoria symptomatically. It seemed characteristic that in many of the cases of insufficiency there were periods of exacerbation of the irritability. When these exacerbations occurred, atropine was useful in placing the eyes at rest, after which they would be more comfortable for a period of time. It would seem that therapeutic cycloplegia should be used more often in the various irritable, asthenopic states, even in the presence of definite presbyopia.

Inasmuch as this anomaly is an insufficiency, one would think it might be amenable to orthoptic treatment. Maddox and Pugh obtained indifferent results with this method of treatment. We have had no experience with it, but will try it in selected cases.

Operation has been recommended by Dunnington[7] for the more refractory types of this condition. This is undoubtedly the correct procedure. We have perhaps been unduly conservative in not attempting surgical treatment in these cases because of the somewhat conflicting and disturbing factors that were present. As a group, the patients appeared to be poor surgical risks. The psychic and neurologic traits and the intrinsic irritability exhibited by many of these patients led us to hesitate to employ surgical treatment. Perhaps in the future, as we study these cases more intensively and differentiate them more closely, we may be able to select more patients for surgical treatment. One patient who was treated surgically did well objectively and obtained normal muscle balance, but subjectively he showed no lasting improvement. Those who have severe functional disturbances will probably not improve under any form of treatment. The operation of choice, theoretically, should be a reinforcement of the external recti muscles, but perhaps recession of the internal recti muscles plus exercise of the external muscles would achieve the same result.

Results of nonoperative treatment, as here outlined, were satisfactory in this series. Fifteen patients were observed for more than two years. In 24 cases in which we were able to observe the pa-

tients, a reasonable degree of ocular comfort was obtained. In many of these cases the relief obtained was striking. In the group of cases in which there was nervous and mental involvement the results were not good, in others they were unknown or of questionable value.

Summary

Divergence insufficiency is a definite clinical entity that causes considerable asthenopia, particularly in near vision. Four cases of divergence paralysis were observed. It would appear clinically that there is probably a cerebral center for active control of the divergence mechanism. In many cases of this series, the incorporation of prisms, base out, in the correcting lenses was most useful. Hyperphoria occurs frequently in association with the esophoria in these cases, and should probably be corrected by the addition of a vertical prism. These eyes seem to show a combination of pathologic states, such as decreased divergence, anisometropia with irritability, vertical imbalance, subnormal accommodation, beginning presbyopia. Such conditions are associated with functional disturbances and an unstable nervous system. With such a combination, ocular discomfort is unavoidable. Nonoperative treatment, as here outlined, has been of definite assistance to 50 percent of the patients reported in this series of cases. Orthoptic training and operation probably should be tried more frequently in selected cases.

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Discussion

Dr. James Watson White, New York: Dr. Prangen's paper deals with a condition troublesome to both the patient and the ophthalmologist.

I have not found, as Dr. Prangen has, that the symptoms are more marked at the near-point. Rather the panorama asthenopia and double vision are much

more annoying for distance. There is always an esophoria or esotropia for distance, but at 33 cm. there may be only a trace of esophoria. Frequently there is an exophoria at 25 to 30 cm., and at 20 cm. there is practically always an exophoria. The convergence near-point is rarely excessive, and is more likely to be remote. The esophoria or esotropia, as well as the diplopia for distance, grows progressively less as the light approaches the eyes, and both disappear at some point within 1 M., depending on the amount of the deviation. It is an interesting observation, although usually not necessary to a diagnosis, to measure the amount of the esophoria, also the diplopia, at 6 M., 3 M., 1 M., 0.50 M., 0.25 M. In doubtful cases the deviation for distance should be measured at 25 to 50 M. also. The diplopia test is not so dependable as the actual measurement of the amount of deviation by the screen test.

I have found, as Dr. Prangen has, that there is some degree of hypocyclosis for which a plus lens must be added for reading. This plus lens, however, does not reduce the esophoria for distance if the esophoria is due to a divergence insufficiency. However, if the esophoria is due to a convergence excess, the esophoria for near is definitely lessened. If the esophoria is about the same for distance as for near, and if atropine or plus lenses will definitely reduce it, the condition is probably a convergence excess; but if the esophoria for near is considerably reduced, or if it is changed to an exophoria, and the esophoria for distance is practically unchanged, then a primary divergence insufficiency probably exists.

It is possible that some of the patients observed by Dr. Prangen were primarily cases of convergence excess. This would seem probable, since the symptoms for near work, instead of for distance, were so much increased, as in a typical divergence insufficiency.

Prism divergence for distance is below normal and may be nil, whereas for near the prism divergence may be quite normal. I have not found a prism divergence as much as 3 D. to 4 D., as Dr. Prangen has.

Prisms, base out, in the distance glasses are well borne, but in close work if used for near as well they may increase the symptoms. The prisms in the reading correction tend to act as a prism-convergence exercise and to increase the esophoria for near. This is proved by the fact that if the patient is using prisms, base out, when first seen, by removing the prisms the esophoria for distance will remain unchanged, whereas the esophoria for near will be definitely lessened. In a case reported here the esophoria for near was changed to an exophoria.

No form of divergence exercises has been of any aid in my cases of divergence insufficiency. However, if the condition is one of convergence excess, divergence exercises are a definite aid. I have not found the high incidence of nervous symptoms and constitutional conditions which Dr. Prangen has found.

The following cases are typical:

Case 1. J. P. H., male, aged 38 years, was seen in August, 1919. At the age of 32 he began to have headaches and asthenopia. He did not recall having seen double at first. He was wearing +0.75 D. sph. ⌓ 3½ D., base out, both eyes, with vision of 20/15. P. = 6.5 D., right and left. Homonymous diplopia, 4 D. at 16 feet; 3 D. at 10 feet; 1 D. at 15 inches. Fuses at 10 inches. Esophoria for distance, 8 D.; for near, 6 D. Exophoria, a trace in looking to the right or left at 33 cm.

On adding +2.25 D. sph. to his correction, the esophoria was 5 D. for distance, with 2 D. of exophoria for near. The

prism divergence was nil, a 1 D. prism producing diplopia at 20 feet.

Since many forms of treatment had been used by those who had previously treated him, and since complete tests had been made to determine the etiology, these were not repeated.

The left external rectus was resected at once, and on removing the first dressing on the second day the patient said that his distant vision was comfortable for the first time in eight years. The first recorded tests were made two weeks after the operation, and showed an exophoria of 1 D. for distance and 3 D. for near. Prism divergence, 7 D.; PcB = 75 mm. Six months later there was an esophoria of less than 1 D.; prism divergence, 7 D.; exophoria for near, 3 D. Four years later (1923) there were headache, nausea, and asthenopia. He had orthophoria for distance, prism divergence 5 D., PcB. = 60 mm. A change in his glasses relieved the symptoms.

July, 1927. Exophoria, a trace only, for distance and near; prism divergence, 3 D.

In 1933, 14 years later, there was an esophoria of 6 D. for distance; exophoria, a trace for near. Divergence, 3 D. An increase in the presbyopic correction with an addition of 1 D. prism, base out, entirely relieved the symptoms.

In 1935, with R.E. +1.00 D. sph. L.E. +0.75 D. sph. ⌯ +0.25 D. cyl. ax. 180°, he had 20/10 vision. Esophoria, 2 D. for distance; exophoria, a trace for near. Trifocals were prescribed with 1 D., base out, and +2.50 D. sph. added for reading. These were most satisfactory. This case is interesting because it was so typical, was relieved of symptoms by operation, and ran an uneventful course for sixteen years, during which time the prism divergence was never less than 3 D.

Case 2. Mrs. M. B. C., aged 72 years, wears R.E. +3.00 D. sph. ⌯ +0.37 D. cyl. ax. 180°, with 20/15 vision; L.E. +3.00 D. sph., with 20/15 vision. Esophoria at 6 M., 9 D.; at 3 M., 9 D.; 1 M., 5 D.; 0.50 M., 2 D. At 25 cm. there was an exophoria of 2 D. She fuses at 20 feet with 2 D. base out, right and left. This is not enough for a distance of from 200 to 500 yards, and is too much for a distance within 10 feet. In this case a prism, base in, may be placed in the reading segments to counteract the prism for distance. With the marked change in esophoria or esotropia, as the distance varies, it is impossible to relieve the symptoms entirely by prisms, and, as in the first case, resection of the externus or occlusion of one eye would give the greatest relief.

Dr. Thomas D. Allen, Chicago: This is a very important contribution, I think. The fitting of glasses and the fitting of prisms are troublesome to most of us. Many ophthalmologists have stopped the fitting of prisms entirely because they are so unsatisfactory.

I think one of the tests which Dr. Prangen did not have time to speak about should be emphasized, and that is whether or not there is the ability to fuse. If a person obviously has no ability to fuse, prisms will do no good. We may demonstrate all sorts of phorias, and if the patients do not fuse, of what use are prisms? Occasionally prisms may be of some use when there is weak fusional ability; but we usually—and I presume Dr. Prangen always—test for stereopsis. We have now at hand one of the Keystone sets of about a dozen charts showing letters and numbers at different distances apart, and as a result of testing with these charts we can tell the relative stereopsis. We find also, when we are a little hesitant about fitting prisms, that it is of great value to put in a light-weight frame the glasses that we believe should be used, and then add or subtract the prisms, and let the patient wear the

glasses for a half-hour or longer in the office. Occasionally paitents must come back a second time for this little test. I was very much interested in this paper, and it seems to me that it ought to provoke considerable thought.

DR. AVERY DE H. PRANGEN, closing: I thank the gentlemen for their discussion, and I am particularly gratified that there is some difference of opinion, because it makes one feel that he has stirred up an interesting subject.

X-RAY STUDIES OF THE NASOLACRIMAL DUCT*

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Investigation of the nasolacrimal tract by injection of lipiodol or other opaque material and followed by roentgenographic examination, is of definite value in adding to the information obtainable by the usual clinical procedures. The clinician may not, however, be inclined to think of this type of examination at the moment he sees the patient, and unless it is borne in mind, the study may not be requested in those cases where it would be of great value. We therefore wish briefly to review the material which has passed through the X-ray Department of the Wills Hospital in Philadelphia during the past few years and to indicate the type of cases in which this procedure has been of value.

Investigation of the lacrimal tract by the injection method was reported in 1909 by Doctor Ewing, who used a bismuth preparation. Other authors have carried out the procedure using various opaque mixtures. We have found results to be highly satisfactory when lipiodol diluted with equal parts of sterile olive oil was slowly injected into the lower punctum with a blunt needle, one-half to one cubic centimeter of the mixture being used. Anesthetization of the conjunctiva is unnecessary. The patient experiences no distress, and there have been no untoward results.

We advise that the X-ray films be exposed immediately, followed by examinations at intervals of approximately 5 and 15 minutes. Other studies are made at intervals of one or two hours in cases of an obstructed lacrimal tract. X-ray projections are made in the postero-anterior, Waters, and lateral projections. It is occasionally of value to make stereoscopic films, but this is usually unnecessary.

In the average normal cases it requires approximately five to seven minutes for the lipiodol to pass through the lacrimal tract and into the nasal fossa. In the presence of obstruction, the opaque material may be retarded for several hours.

We believe that there has been a very decided advantage in diluting the opaque mixture with equal parts of sterile olive oil and observing the time of passage throughout the lacrimal tract. The original viscosity of the lipiodol is too great to allow free passage through a small syringe. By using olive oil as a diluent we considerably reduce the viscosity of the original lipiodol and do not detract from the opacity to the X ray. An ordinary 23-gauge hypodermic needle filed to a blunt point can be inserted in the lower punctum. The dilute lipiodol will flow freely without any undue pressure on the syringe piston, thereby rendering the technique of injection extremely simple. We do not try to force the injection but attempt to inject about 0.5 c.c. of the mixture. When the sac is appreciably distended, we discontinue

* From the X-ray laboratory of the Wills hospital.

and proceed with the radiographic examination. At present we do not make a diagnosis of obstruction at the outlet of the sac unless there is retention of the mixture within the sac for a period of more than 15 minutes and absence of any visible lipiodol in the lower nasolacrimal duct, or in the nostril. This also applies to any other point along the lacrimal tract where there appears to be evidence of obstruction on the first X-ray study.

This procedure has proved to be of great value in cases of inflammatory disease with obstruction or adhesions, congenital conditions, fistulae, extrinsic pressure, and in postoperative cases.

It has also been found that projections of the region about the inner orbital bor-

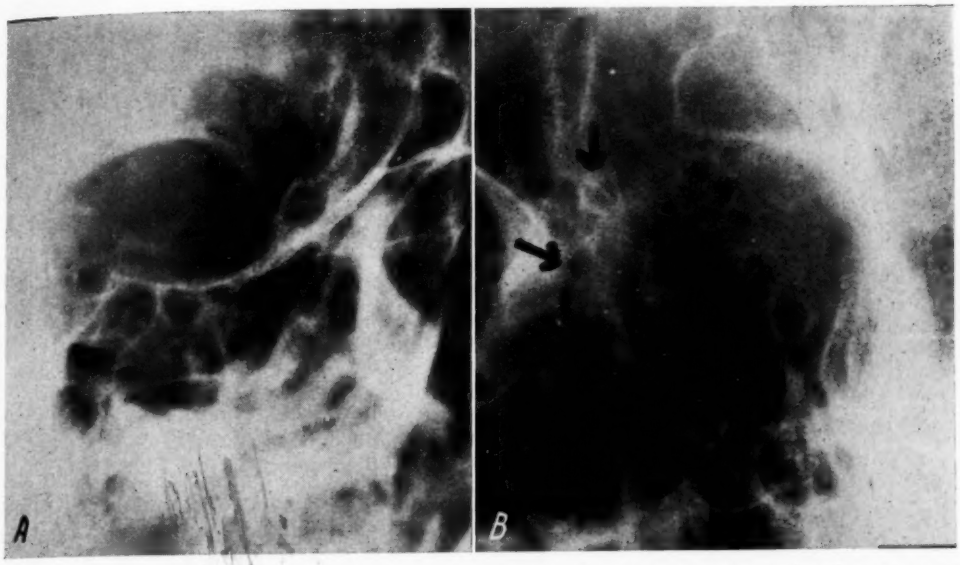

Fig. 1 (Spackman). A, X-ray projection of a normal orbit. Note that the trabecular structure of the ethmoid cells shows through the inner wall of the orbit. B, there is increased density of the osseous structure of the inner orbital wall due to localized osteitis.

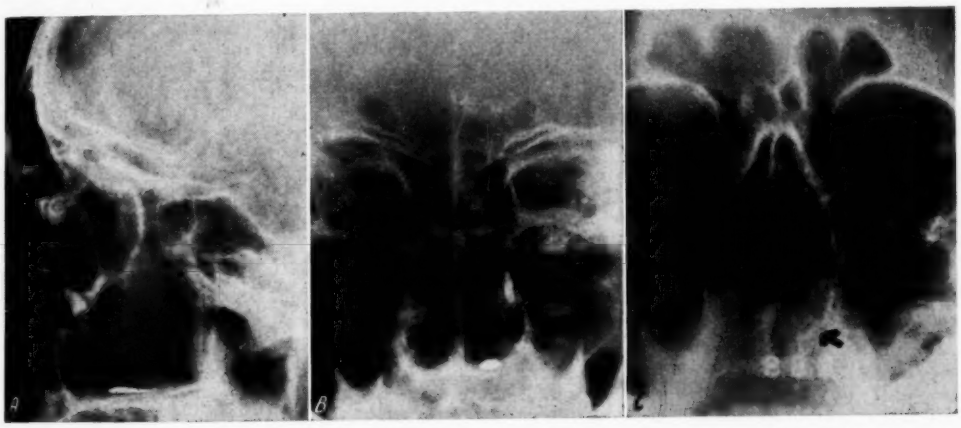

Fig. 2 (Spackman). A, filling of a normal lacrimal sac. B, upper portion of nasolacrimal duct is well visualized. Opaque material has entered the nasal fossa. C, nasolacrimal duct is visualized throughout its entire extent.

der and lacrimal bone are of value to show inflammatory conditions in the bone or adjacent ethmoidal cells. This is done by projecting the orbit on the X-ray film in the position commonly used for examining the optic foramen in cross section. It does not, however, require so great accuracy in placing the patient's head for this study as when the optic canals are to be studied. It is usually sufficient to place the head in an oblique position on the X-ray film, so that the orbit to be examined is near the film, and the chin, tip of the nose, and cheek bone are resting against the surface of the film. Figure 1-A shows a normal roentgenogram in this position and figure 1-B shows osteitis in the lacrimal bone, secondary to a dacryocystitis.

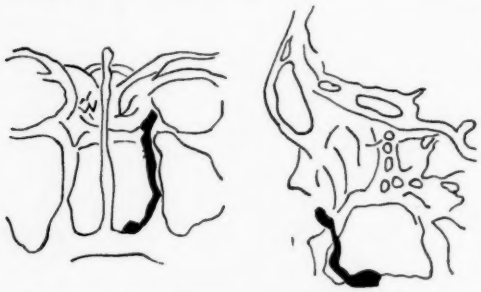

Fig. 3 (Spackman). Composite drawings made by superimposing X-ray films to show the appearance of the nasolacrimal tract completely filled (in practice we never visualize it to this extent).

An attempt should be made to visualize the entire length of the nasolacrimal tract. Very often, on the first study, only the sac is visualized (fig. 2-A). The upper part of the duct may be seen on the original examination, or at the second study (fig. 2-B). The lower portion of the tract is usually best visualized on the second or third study (fig. 2-C). The lipiodol should also be visualized within the nasal fossa. This definitely indicates that the canal is patent throughout its entire extent.

A composite drawing (fig. 3) is made by superimposing normal roentgenograms of the nasolacrimal duct, showing the entire extent of the tract as it appears to the X-ray examination. In practice, however, the tract is seldom, if ever, visualized as completely filled. The criterion of the usual normal study is to visualize the sac at the first examination, which is made immediately after the injection; the upper portion of the tract at the second study, which is made about five minutes after injection; and the lower portion of the tract with lipiodol free in the nasal fossa at the third examination, which is made fifteen minutes after injection. This, however, is subject to rather wide variations within normal conditions. If we do not visualize the opaque material within the nasal fossa at the 15-minute study and an unusual quantity is present at a higher level, we are justified in regarding the passage as partially or completely obstructed. It must, however, be remembered that an apparent obstruction to the opaque solution does not necessarily mean a similar degree of obstruction to tears. We must therefore definitely correlate findings with the apparent evidence obtained by X-ray studies before final conclusions can be reached.

Case reports

Case 1. Miss J. W., aged 25 years, was admitted to the hospital with convergent strabismus, complaining also of a soft mass below the left inner canthus from which she could express a thin secretion. No pain or discomfort was present, but tears would collect in the eye and flow over the cheek.

Roentgen examination demonstrated a fistula extending into the areolar tissue below the lower eyelid (fig. 4-A). This tract was grossly irregular.

Clinical course: The nasal lacrimal duct was irrigated on several occasions. Later, examination showed decrease in the size of the fistulous tract (fig. 4-B). Operation

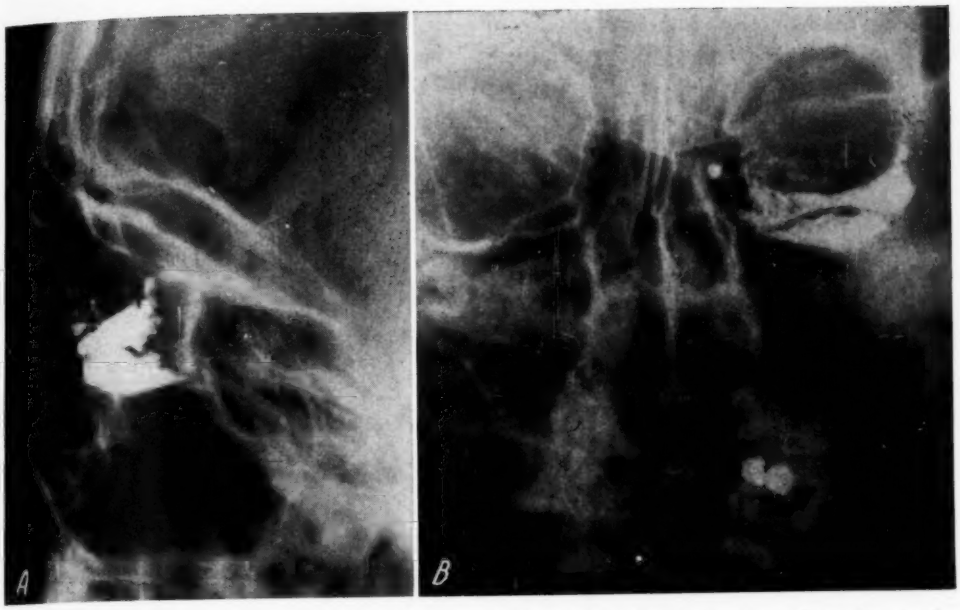

Fig. 4 (Spackman). Irregular fistulous tract extending from the lacrimal sac into the areolar tissue in the lower portion of the orbit (case 1).

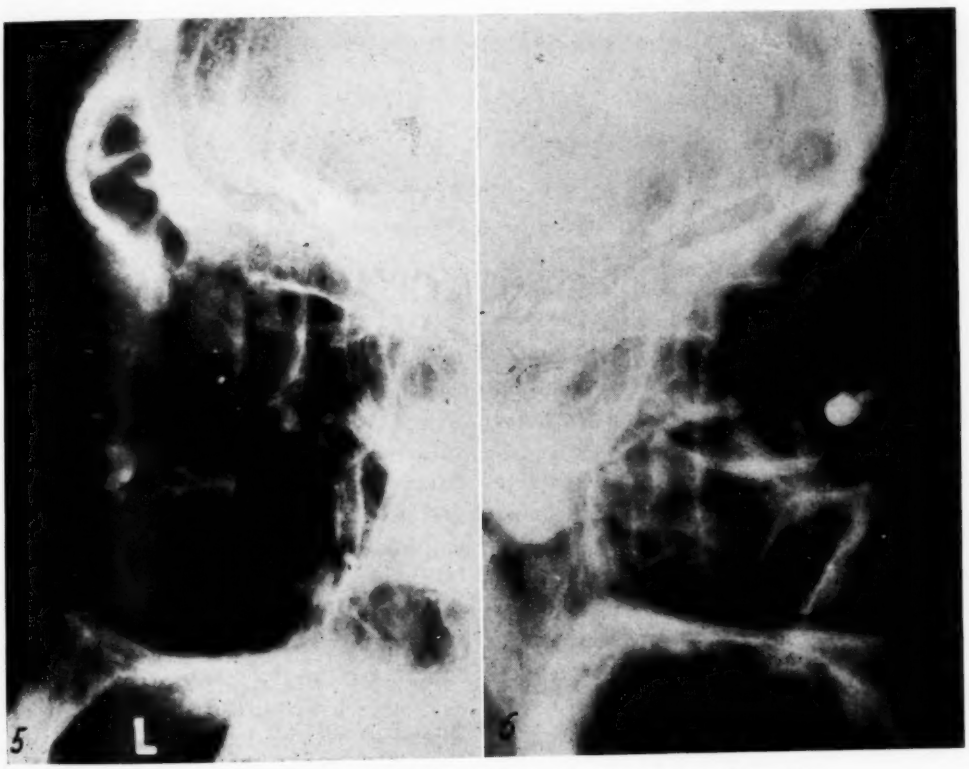

Fig. 5 (Spackman). Complete obstruction of the duct below the sac (case 2).
Fig. 6 (Spackman). Obstruction just below the sac with slight dilatation of the sac (case 3).

to dissect out the tract and close the opening was advised but the patient declined.

Comment: Fistulous tract connecting with the left lacrimal sac and extending into the orbital tissue below the tarsal conjunctiva.

Case 2. Mr. C. H., aged 23 years, complained of a discharge from the right eye and a swelling near the inner canthus which would reduce on pressure. This began seven months previous to admission and was associated with no known cause or other symptoms.

Roentgen examination showed complete obstruction of the nasal lacrimal duct just below the sac (fig. 5).

Clinical course: Dilatation of the constriction was attempted unsuccessfully and it was necessary to excise the sac.

Case 3. Mr. R. S., aged 28 years, was seen in the clinic complaining of a discharge of water and pus from the right eye. This was first noticed four years ago, after an automobile accident in which he had received an injury to the tissues about the inner canthus.

Roentgen examination showed complete obstruction to the nasal lacrimal duct a few millimeters below the sac, with a slight dilatation proximal to this point (fig. 6).

Clinical course: Because of the infection dacryocystectomy was not considered advisable. Treatment was by local medication and probing.

Case 4. Miss M. G., aged 45 years, was referred to the clinic with a diagnosis of dacryocystitis. She complained of having had a small swelling below the inner canthus of the right eye for a period of one year. The mass was soft and fluctuating and could not be reduced by palpation. Attempts at washing the nasolacrimal tract were unsuccessful.

Roentgen examination showed a slight dilatation of the lacrimal sac and total obstruction at the upper end of the duct (fig. 7).

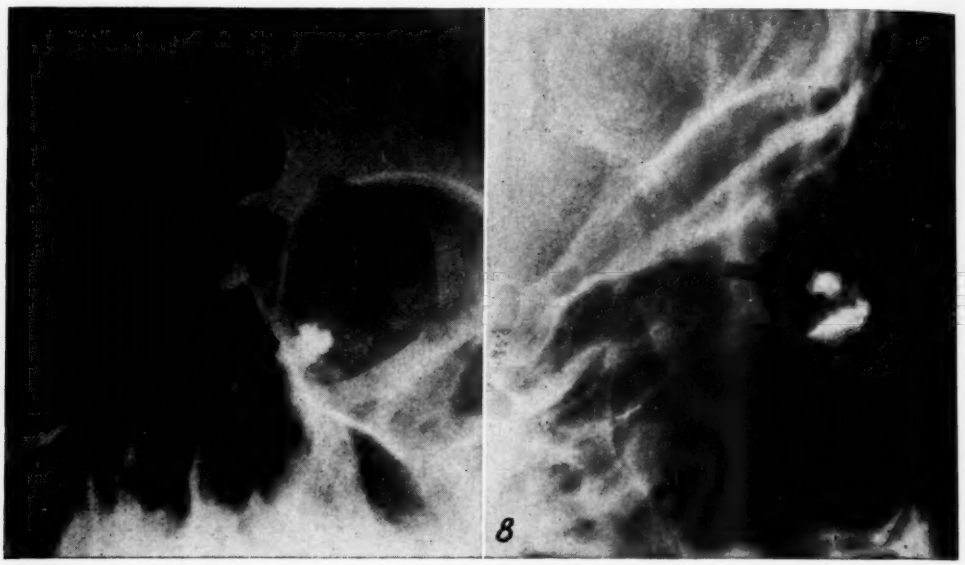

Fig. 7 (Spackman). Complete obstruction at the junction of the sac and the lacrimal duct (case 4).

Fig. 8 (Spackman). Complete obstruction at the upper end of the duct and irregular dilatation of the sac due to adhesions (case 5).

Clinical course. The patient was referred to the surgical division for operation.

Case 5. Miss A. V., aged 53 years, was referred to the X-ray department complaining of exophoria and annoyance due to tears running from the corner of her left eye. This condition had been present over a period of nine months.

Roentgen examination showed a greatly dilated irregular lacrimal sac, and total obstruction at the upper end of the duct (fig. 8). The diagnosis of chronic dacryocystitis and adhesions was made, and the patient was referred to the surgical division for operation.

Case 6. Miss J. B., aged 31 years, complained of an excessive virulent secretion running from the inner corner of the left eye. This had been present over a period of approximately three months.

Roentgen examination showed a large smooth-wall cavitation extending laterally to the inner border of the left orbit and posterior approximately 1½ cm. (fig. 9). This was diagnosed as an abscess of the lacrimal sac with complete obstruction, as no opaque material entered the duct. There was some questionable evidence of erosion of the inner orbital wall and perforation into the ethmoidal cells. The patent was referred to the surgical division for operation. The abscess was excised and drainage established, but it could not be removed. There was no evidence of perforation of the inner wall of the orbit.

Discussion

These cases are typical of the roentgen findings in a series of approximately 100 examinations passing through the Department of Radiology at the Wills Hospital during the past four years. We believe roentgen examination to be of the greatest value in suspected pathology of the nasolacrimal tract, and have found it to be of assistance in the following types of pathology:

1. Congenital deformities. The type and nature of the deformity can be demonstrated in the extent and course of the tract outline. This assists the operator to determine in advance his method of procedure and the kind of operation that would be most advisable.

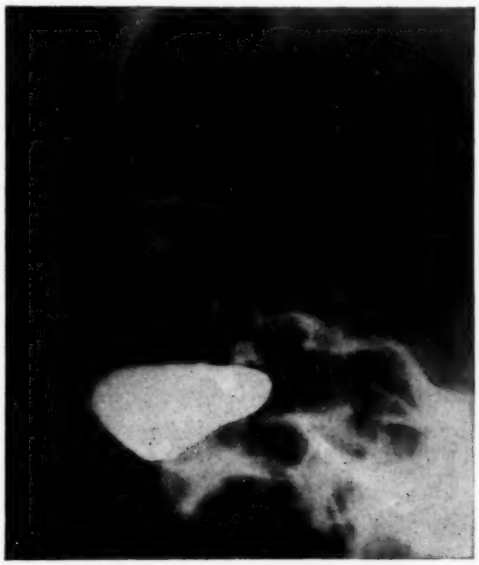

Fig. 9 (Spackman). Large abscess connected with the lacrimal sac (case 6).

2. Infectious processes in the orbital wall or lacrimal bone can be shown. Lacrimal osteomyelitis, however, must be carefully differentiated from an underlying ethmoiditis, and complete roentgen examination of the sinuses is recommended in all cases in which there is any suspicion of osteitis in the region of the lacrimal bone.

3. Atresia of the duct due to inflammatory or other causes. The point of obstruction is shown, and the condition of the proximal duct, thus assisting the surgeon in deciding between continued probing or operation.

4. Conditions of the sac can be shown,

including obstructions at the outlet, dilatations, adhesions, and contraction due to chronic inflammatory disease. These findings help direct the surgical consideration of the case.

5. Fistulas are demonstrable. We recommend X-ray projections from several directions to demonstrate fully the nature and extent of sinuses. Plain film studies are also of value in these cases to demonstrate osteitis in the bone.

6. Pressure and distortion of the sac or nasolacrimal duct due to masses in the surrounding tissues or anomalies of the orbital wall can be differentiated from intrinsic lesions.

7. Malignancy can be differentiated from benign lesions in this area. We recommend plain film studies, complete sinus projections, and lipiodol studies, should there be any question of malignancy.

8. Other conditions are shown such as deformities due to cicatrization of wounds in this area, rupture as the result of trauma, and allied lesions.

Summary

These cases have been briefly discussed in an endeavor to show the assistance that it is possible to give the operating surgeon by X-ray examination in the region of the naso-lacrimal tract.

The normal X-ray appearance of the tract has been studied, and the method of procedure and technical points are indicated.

The examination is recommended in congenital deformities, infectious processes, obstructions, fistulas, and conditions of the surrounding bones and soft tissues.

This type of examination can be used to great advantage in all cases of suspected pathology. It will be resorted to more generally if it is kept in mind by the clinician as he studies his cases.

Thirty-ninth and Chestnut Streets.

TREATMENT OF DETACHMENT OF THE RETINA BY USE OF THE THERMOPHORE

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Philadelphia

In November, 1934, the writer reported a case of detachment of the lower portion of the retina. The patient had been operated on, two months before: a sclerotomy for the purpose of draining the subretinal fluid was followed with applications of Shahan's thermophore, using a 2-mm. tip, at a temperature of 165 degrees. The retina was in good position when the case was reported; the patient had a full field and vision of 5/9. He was last seen in September, 1937, with the conditions unchanged.

Case 2. On November 5, 1935, Miss A. C., aged 42 years, was seen by the writer and gave the following history: About the middle of July, 1935, while entering a motor car she struck her head against the top of the door, and shortly after this noticed a blurring of the vision of the left eye. The vision was variable, some days seeming much better than others, and no medical advice was sought until September 15th, when the whole upper portion of the field of vision became blurred. She went to consult Dr. H. L. Harley of Atlantic City, who discovered a detachment of the lower half of the retina and advised her to consider an operation. For various reasons she did not see her way to do this. The eye, however, became so annoying that when she was seen by the writer on the fifth of November she said that something must be done in a radical way, for the ocular condition was having a very bad effect on her nervous state. Examination showed that the right eye was normal in all respects, with a corrected vision of 5/4. The vision of the left eye was 4/60, the pupil was sluggish to light, the whole lower half of the retina was seen as a floating gray mass, and the upper half of the field of vision and the temporal portion of the lower field were lost. A very careful search could discover no tear in the retina.

On the 18th of November, under local anesthesia, the lower half of the conjunctiva was laid back, two sclerotomy punctures—one down and out, and one down and in—and 11 applications of the thermophore, with a 2-mm. tip, and of one minute's duration each, at a temperature of 168 degrees, were made over the lower anterior portion of the sclera, several as far back as could be reached with the eye in extreme upward rotation. Both eyes were bandaged, the patient was placed in bed with sandbags to the head, and the eye was not dressed for 48 hours. At the end of that time there was some slight reaction of the conjunctiva, but no congestion of the iris or ciliary body. Three days after the operation, an ophthalmoscopic examination showed that the retina was in good position with definite patches of choroidal pigment disturbance at the site of the thermophore applications. Both eyes were kept bandaged for two weeks and then stenopeic spectacles were used and the patient was allowed to move about in bed. She was not allowed out of bed for three weeks from the time of operation. On the 13th of December, vision with a +5 D. sph. was found to be 6/30, and a perimetric examination showed that the form field was normal.

At the last examination, the condition was as recorded, the form field was full, and there was a field for red about 15

degrees from the fixation point in all directions; blue was not recognized except as gray. It is now two years since the operation: The retina is well in place and considering that four months had elapsed between the first appearance of symptoms and the operation, and therefore, that inevitably a certain deterioration in retinal structure had taken place, the result seems fairly good.

Case 3. On February 4, 1936, through the courtesy of Dr. Knox, the writer was permitted to operate on a patient with detachment of the upper portion of the retina, who was on his service at the Episcopal Hospital.

Mr. W. L., aged 52 years, entered the hospital clinic on January 27, 1936, complaining of a marked depreciation of vision in the right eye that had occurred one week previously.

Examination of the eye: The palpebral fissure was somewhat narrowed; the upper and lower lids were slightly edematus; the conjunctiva was faintly injected; the cornea clear; the pupil, 4 mm. in width, regular in outline, centrally placed, reacted to light and consensually. There were a number of small dark opacities in the vitreous. A large detachment of the retina was seen, extending from the 9-o'clock to the 2-o'clock position, with quite a large dip in the center. On transillumination the contents of the detachment appeared to be transparent.

Vision in the R.E. was the ability to detect finger movements above the point of fixation; in the L.E., 6/6. There was a complete loss of the visual field below the fixation point, in the right eye.

Treatment. The patient was admitted to the hospital, laid flat on his back, and sand bags were placed on each side of the head. Atropine was instilled in each eye and pin-point goggles were ordered. A Wassermann test was taken and inunctions of mercury were given. On the following day, the patient stated that he thought his vision had improved slightly.

On February 3d the detachment showed improvement; the fields were taken, and an increase in their size was recorded.

On February 4th, which was 9 days after his admittance to the hospital and sixteen days after the occurrence of the detachment, the patient was operated on.

Operative procedure. The eye was prepared in the usual manner and three drops of a 4-percent solution of cocaine were instilled at three-minute intervals. A retrobulbar injection of 2-percent novocaine was also given. The bulbar conjunctiva was dissected quite freely well beyond the area of the detachment. The sclera was then pierced on either side of the superior-rectus muscle with a von Graefe knife, thus allowing the subretinal fluid to exude. The thermophore was applied seven times at different points on the sclera corresponding to the area of detachment. The temperature of the thermophore was 168 degrees and it was held applied to the sclera for one minute at each application, a 2-mm. tip being used. The conjunctiva was then replaced, sutured, and the patient returned to the ward. After 48 hours the eye was dressed. There was present a small amount of edema of the lids and conjunctiva, which gradually subsided. Examination with the ophthalmoscope showed the retina to be completely reattached and the fields taken roughly with the fingers showed complete recovery. On February 11th, there was a slight rise in temperature probably toxic in origin. This disappeared after eliminative treatment was given.

The patient was confined to bed for three weeks following the operation. The fields were again taken, and the result showed complete recovery of the field of vision. The refraction was tested with a

small minus cylinder—20/40 vision was obtained.

Case 4. On June 18, 1936, Mrs. W. L., aged 48 years, was seen through the kindness of Dr. H. L. Harley of Atlantic City. All ocular history had been negative until May 28, 1936, when she noticed some spots before the right eye. She had fallen down some steps in 1935, but had had no disturbance of vision until eight months later; it is probable, therefore, that this fall had nothing to do with the ocular condition.

Dr. Harley on May 28th had found some vitreous opacities in each eye, but the corrected vision in each eye had been 5/5+. On June 7th the patient again fell down four steps, and on June 13th, when next seen, vision had fallen to 5/30. There was a beginning detachment of the temporal portion of the retina of the right eye, about four disc diameters from the disc, the elevation being in the shape of a sausage, its long axis in the vertical meridian with apparently subretinal exudate. Five days later, on June 18th, this retinal separation had extended to the periphery, and central vision was reduced to 5/60. At no time did the retina show any tear. The patient was placed in bed but in spite of rest there was no improvement, vision later falling to 3/60 with a loss of the nasal field in the right eye.

On June 22d, the temporal half of the conjunctiva was raised, two scleral punctures were made, evacuating considerable subretinal fluid, and eight thermophore applications at 168 degrees were made. There was very little reaction, and in a week the upper half of the detached portion of the retina was found to be in good position, but the lower half was still separated. On July 2d, the lower portion of the eye was again operated on, the scleral punctures again permitting the escape of some subretinal fluid, and four thermophore applications were made. There was very little reaction after this, but the retina did not go back into place. On July 17th the patient was discharged, with the central vision unimproved (still 3/60), but with the lower half of the nasal field again useful. She has never felt that she would care to have any further operative attempts made, and when last seen, in May, 1936, the conditions were unchanged.

Case 5. On January 23, 1937, Mr. D. G. H., aged 31 years was seen. Three days before he had noticed that the left eye was hazy and that this blurring had greatly increased. He had been seen by Dr. Landis in Reading, and also by Dr. Griscom who had made a diagnosis of partial detachment of the retina. He had recently had a cold and an otitis media on the right side. About three weeks before noticing the blurring of vision he had had a fall from a curb in the street.

Examination showed that the central vision of the right eye was normal and that this eye was healthy in all particulars. The left eye had central vision of 5/15, with a sluggish pupillary light response and a detachment of the lower outer portion of the retina, including a loss of the superior nasal field from fixation to the periphery on an oblique line of the 60-120 degree meridian. Transillumination showed a good light transmission, and there was no tear to be seen in any portion of the retina; neither had Dr. Landis nor Dr. Griscom seen any tears.

The patient was advised to go to the hospital, and on March 8th an operation was performed: The lower half of the conjunctiva was elevated, scleral punctures were made in the lower inner and lower outer quadrants, and eight applications of the thermophore, using a 2-mm. tip, at 160 degrees were made, each application being one minute in duration.

In 10 days the lower inner portion of the detached area was in good position, but there was still a slight elevation in the lower outer quadrant. On April 9th, the conjunctiva over this portion was again raised and four thermophore applications were made after a scleral puncture had evacuated a small amount of subretinal fluid. After this, the retina seemed in good position over the whole fundus, and on the 24th of April the patient was discharged with a full field and a corrected vision of 5/6. He was allowed to return to work the 1st of June, and since then the eye has remained in good condition. He was last seen on September 1st, when he had a central corrected vision of 5/6 and a full field.

This was the fifth patient operated on in this way, and so far four have been successful: one for three years, one for two years, one for twenty months, and one for five months.

Discussion

In October, 1936, Dr. W. E. Shahan reported a case at a meeting of the St. Louis Ophthalmic Society (see American Journal of Ophthalmology, 1937, volume 20, page 631). His report has not yet been published in full but he reverses the procedure which I use, applying the heat first and performing the sclerotomy afterwards in order to maintain intraocular tension while applying the thermophore; also because he and Dr. L. T. Post have found that 165 degrees of heat with a thermophore applied to the sclera destroyed the retina at the site of the application in experimental animals in which there was no detachment. He believes, therefore, that it is better to apply the heat while the retina is held away from the choroid by the subretinal fluid.

I have never had any trouble with the lowering of the intraocular tension by the sclerotomy punctures, and it is difficult to see how a certain amount of damage to the retina can be avoided if we are going to have exudate enough thrown out to produce adhesion to the choroid.

In the discussion Dr. John Green stated that he had performed a similar operation: "The patient, a woman, 72 years old, had a detachment below. After a few days in the hospital he laid back the conjunctival flap over the site of the detachment, made three trephine holes in the sclera, and then applied the thermophore at 153 degrees. Then with a Graefe knife he allowed the subretinal fluid to escape. He had not reported this case because the patient died at the end of a week from an embolism; but, at any rate, the progress up to that time had been satisfactory and he was sure the retina had become reattached."

Dr. Green's use of the thermophore at 153 degrees was apparently effective in his case, and it may be that this temperature is enough to bring about a sufficient reaction in the choroid, which, after all, is the desired effect. The lowest temperature which will produce this effect is, of course, the best—the less damage to the retina the better. Dr. Green's trephining seems to me to be superfluous and rather a needless traumatizing of the eye, for the heat will pass through the sclera without any difficulty, and it is less dangerous to evacuate the subretinal fluid with a knife than by other means.

Conclusions

Anything which will produce a reaction in the choroid sufficient to cause an exudate which will cement the retina to the choroid and will not too greatly damage the intraocular structures will serve as a means to overcome a detachment of the retina.

The procedure which was used in these cases is, of course, much simpler in both technique and equipment than other

methods for the relief of retinal detachment and seems to offer a manner of treatment which does little harm to the structures. Should it not succeed, nothing has been done to prevent a more radical operation later on. In the writer's opinion it is very necessary to keep both eyes bandaged and the patient quiet for at least a week. The patient should be kept in bed another week with but little moving about permitted, and stenopeic spectacles should be worn, for only in this way will the adhesions between the choroid and the retina have a chance fully to organize. The use of stenopeic spectacles should be continued for at least four weeks after the patient is out of bed or until six weeks after the operation, inasmuch as ocular rotations would undoubtedly tend to loosen the adhesions. As in all methods of treating a detached retina, the best results will be obtained in the most recent cases.

1530 Locust Street.

STUDIES ON THE INFECTIVITY OF TRACHOMA*

VIII. Biology of the infectious agent

L. A. Julianelle, Ph.D., and R. W. Harrison, Ph.D.
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The consecutive communications from this laboratory on the etiological agent of trachoma have recorded primarily its capacity to induce specific infection under varied conditions in monkeys. While these studies reflect indirectly certain of the grosser attributes of the incitant, they do not supply sufficiently detailed information toward its biological and physical characterization. Consequently, it is proposed at the present time to describe and analyze experiments undertaken in this connection and to compare them in certain instances with those of other investigators. Aware of the dangers of generalization with an agent as erratic as that of trachoma, it nevertheless seems justifiable to depict the properties to be described below as characteristic. In an effort to minimize these dangers, however, it has been necessary to repeat experiments frequently; and for purposes of control and orientation to determine the specific infectivity of the original unaltered trachomatous tissues; and finally to induce at a later date experimental trachoma in those animals (*M. rhesus*) previously unaffected by inoculation of the altered material, thus eliminating animal resistance as a factor in the preceding unsuccessful transmissions.

Experimental

In studying the nature of the infectious agent, it has been found convenient to group under different topics the experiments conducted. Accordingly, the influence of different physical and chemical agents on the incitant** has been determined, and to supplement the analysis, additional information has been sought concerning the immunogenic capacity, thus complementing other data already published on its biological characteristics. The methods of study employed are in general those described in previous

* From the Oscar Johnson Institute, Washington University School of Medicine.
Conducted under a grant from the Commonwealth Fund of New York.

** The trachomatous tissues studied were obtained from patients at the Trachoma Hospital at Rolla, Missouri, through the interest and coöperation of Dr. J. E. Smith, the director.

reports, but where any modification or new technique became advisable, a description is appended.

BEHAVIOR OF THE INFECTIOUS AGENT UNDER PHYSICAL CONDITIONS

Trituration. That the mechanical action of grinding has no effect on the infectious agent was determined early in these studies. Trituration of trachomatous tissues has accordingly been adopted as a routine procedure in preliminary manipulation of material for inoculation in animals. The experiments of Stewart,[1, 2] Thygeson,[3] and ourselves are in accord on this observation.

Centrifugation. In preparing material for filtration,[4, 5] it has been found necessary to eliminate detritus and various tissue cells in order to prevent subsequent obstruction of the filters. Consequently, it was found that centrifugation at a low rate of speed over short periods of time (for example 1,500 r.p.m. for 5 minutes) does not deprive the resulting supernatant fluid of its specific infective capacity. Prolonged centrifugation, on the other hand, carries most, if not all, of the infectious agent to the sediment. However, the duration of centrifugation and the speed required for complete sedimentation of active material vary for different specimens, although in a general way 30 minutes at 5,000 or more r.p.m. may suffice in rendering the supernatant fluid noninfectious for monkeys. In this connection it is important to refer to experiments reported by Stewart[1] in which he demonstrated that washing the sediment from successive centrifugations of a given material does not separate the infectious agent from the active tissue mass. This may indicate that the infectious agent is closely adherent to, or even present within, the infected tissue cells, an opinion elaborated upon in an earlier communication.[4]

Desiccation. That desiccation of the infectious agent of trachoma is accompanied by inactivation was first brought out by Hess and Römer.[6] They found that material which was dried and then kept pulverized for four weeks was not infectious. After desiccating material and subsequently testing its effect on baboons after one-half and one hour at 15°C., Botteri[7] found trachomatous tissues noninfectious. Later Nicolle, Cuénod, and Blaizot[8] reported that drying of trachomatous tissues, effected by 30 minutes at 32°C., resulted in a loss of infectivity. In this laboratory, desiccation was studied primarily as a means of preserving the infectious agent, and, while the experiments are not numerous, the results are clear that originally infectious material loses infectivity in a few days at the most when kept in a desiccated condition.

Preservation. Various authors in the past have attempted to preserve the infectivity of human tissues under different physical conditions with varying results. Thus, Mijaschita[9] found that while tissues in normal salt solution remained infectious after 1½ hours in the incubator (37°C.), they were inactivated after a period of 10 days. Similarly, Botteri[7] reported that after 3 hours at 0°C., 10°C., or 15°C., human tissues lost their original infectivity for baboons. More recently, Baroni and Mihail[10] conducted a number of experiments on preservation in human volunteers, but since they neglected to determine the original activity of the tissues studied, the significance of some of the data remains questionable. Thus, preservation of the infectious agent in the anterior chamber of rabbits over 12, 24, and 48 hours yielded material that was inactive; in dog plasma from 6 to 48 hours at 5 to 6°C., and in one case for 24 hours at 37°C., tissues retained their activity, but lost it after 6 to 10

days at 37°C. In another experiment they found that tissues kept at room temperature, in one instance for 30 hours, and in another for 3 days, were still infectious.

In this laboratory, preservation has been studied at icebox, room, and incubator temperatures. The human material obtained by grattage was suspended in either normal salt solution, Tyrode's solution, or veal infusion broth (pH 7.6), with preference given to the last named, although no differences referable to menstruum were detected. In each experiment the human tissues were first verified for their ability to infect monkeys, and when the original material was found to be noninfectious, the entire data were discarded. With tissues of authenticated activity, then, it was observed that the variations in results obtained with different materials were very great. Thus, in the refrigerator (4°C.) different samples have remained active from one day up to a week, all others tested beyond that period being inactive. At room temperature (20°-24°C.) there has been an observed variation of from several hours to 24 and occasionally 48 hours, while in the incubator (37°C.) inactivation usually occurred within a few hours and only rarely required more than 24 hours.

Thermal inactivation. As is to be anticipated, the inactivation of the infectious agent by heat has been studied by several investigators. However, the various temperatures and periods of exposure selected by the different observers makes it difficult to compare their results. Thus, Hess and Römer,[6] in a single uncontrolled experiment, found that after 30 minutes at 58°C. to 63°C., material was not infectious; Botteri[7] reported that 3 hours at 43°C. was not survived by the incitant of trachoma, and Nicolle, Cuénod, and Blaizot[8] rendered infectious material inactive by heating it at 50°C. for 30 minutes. Baroni and Mihail,[10] on the other hand, reported that the infectious agent suspended in human plasma survived 30 minutes at 56°C. Thus, then, it is seen that inactivation by heat, approached in each instance by a single experiment, was determined on conditions of temperature and exposure chosen arbitrarily, so that accurate estimation was unattainable.

In this laboratory, the effect of heat was established with suspensions of grattaged human material suspended in veal infusion broth. Consequently, the infectious agent was present in a mixture of lacrimal secretion, blood, and tissue cells, consisting chiefly of epithelial cells and to a much less extent of lymphocytes and monocytes. What protective influence may have been exerted by these different constituents it is obviously impossible to state. In any case, these suspensions were immersed in a water bath regulated at different temperatures (40°, 45°, 50°, 55°, and 60°C.) and for varying intervals of time (15, 30, and 45 minutes). It soon became obvious that the two higher temperatures were unnecessary, since they regularly caused inactivation, so that both temperatures and the 45-minute exposure were abandoned. At the end of the exposure the material was cooled under tap water and inoculated in monkeys by the usual technique,[11] and at the same time the original unheated material was inoculated in other animals. The experiment was repeated several times with the conclusion justifiable that exposure at 45° to 50°C. for 15 minutes suffices to inactivate the trachomatous agent.[12]

Freezing. Simple freezing has little effect on the infectious agent. This was discovered early in these studies, so that now grattaged material obtained in the field is always preserved in ice during transportation to the laboratory. On certain occasions, material has been main-

tained in a frozen state for as long as 24 hours without loss of infectivity. Repeated freezing and thawing, however, has been found to inactiviate the infectious agent. Thus, 12 to 16 alternate freezings (—10°C.) and thawings (+10°C.) cause lysis of most of the tissue cells present and also loss of infectivity.[12]

EFFECT OF CHEMICAL SUBSTANCES ON THE INFECTIOUS AGENT

In order to determine the behavior of the incitant of trachoma in the presence of different chemical agents, grattaged material from patients was collected in broth and the substance in question was added immediately to a portion of the suspension. Since in each experiment the trachomatous tissues were procured in the Trachoma Hospital at Rolla, Missouri, at least three hours elapsed before it was possible to perform inoculations in the laboratory. This is by way of explanation concerning the regularity of time exposure in the experiments to be described.

For the sake of conciseness, the data bearing on these experiments have been summarized in table 1. Thus, it will be seen that ox bile, added to an amount of one fourth or one third the volume of the trachomatous suspension, causes inactivation of the infectious agent after an exposure of 15 minutes at 37°C. At the end of this interval, practically all the tissue cells are lyzed, and the inclusion bodies when present are dissolved; while, as might be expected, the bacteria originally present remain viable and cultivable. In this connection it is interesting to point out that bile salts were suggested in the therapeutic control of trachoma originally by Paparcone[13] and since then by others.

Gentian violet in ultimate dilution of 1:100,000, and tartar emetic 1:1,000, both rendered inactive the infectious agent in a period of 3 to 4 hours. Silver nitrate in a concentration of 2 percent caused a heavy coagulation of the suspension and a loss of infectivity. A 0.25-percent dilution of phenol was also destructive to the infectious agent. Cocaine was found to be regularly inactivating when used in concentration of 4 percent, but in only about half the times tested when used in 2-percent quantities.

TABLE 1

EFFECT OF DIFFERENT AGENTS ON THE INFECTIVITY OF TRACHOMATOUS TISSUES

Agent	Concentration	Time	Effect
Bile	25–35%	15 min. at 37°C.	Inactivation
Heat	—	15 min. at 45–50°C.	Inactivation
Gentian violet	1:100,000	3–4 hrs.	Inactivation
Tartar emetic	1:1,000	3–4 hrs.	Inactivation
Silver nitrate	2%	3–4 hrs.	Inactivation
Phenol	0.25%	3–4 hrs.	Inactivation
Cocaine	4%	3–4 hrs.	Inactivation
Alternate freezing (−10°C.) and thawing (+10°C.)	—	12 to 16 times	Inactivation
Freezing	—	Up to 24 hrs.	None
Glycerine	50%	Tested to 2 weeks	None
Patient's blood	—	3–4 hrs. at 20°C.	None
Normal blood	—	15 min. at 37°C.	None

Effect of glycerine. The influence of glycerine on trachomatous materials has been reported by several workers with a remarkable difference of opinion. Nicolle, Cuénod, and Blaizot,[8] the first to determine the behavior of the infectious agent

in glycerine, found human tissues remained infectious after seven days. Baroni and Mihail[10] detected no change in infective capacity at the end of 1-, 7-, and 24-hours' exposure. Candian,[14], on the other hand, stated that tissues in glycerine are inactivated, and Stewart[1] demonstrated inactivation of the infectious agent when exposed to glycerine for 24 hours. More recently, Busacca[15] reported that glycerine exerts a preservative effect on the trachomatous agent.

In this laboratory, the effect of glycerine was studied primarily as a means of preserving infectious material. In conducting the experiments, the original trachomatous suspensions from patients were tested for specific infectivity, and when noninfectious, the experiments were rejected. Half the original material was kept under similar conditions without glycerine, and to the other half was added glycerine (Schering-Kahlbaum) to a final concentration of 50 percent. Both samples were then kept in the refrigerator and inoculated in monkeys at different intervals. The results of repeated experiments indicate that at icebox temperature (4°C.) glycerine does not maintain the infectious agent active any longer than preservation in the absence of glycerine. As was pointed out above, simple preservation at this temperature exhibits great differences depending upon the individual material, so that it may be concluded that glycerine has no effect on the infectious agent. It seems likely, therefore, that the variations reported by different workers on the influence of glycerine are due essentially to variations in the keeping qualities of the original tissues.

Immunogenic properties of the infectious agent

The common clinical observation that trachoma is not accompanied by an immune response in patients led in an earlier study[11] to a determination of increased resistance to trachoma in monkeys spontaneously recovering from the experimental disease. It was shown at that time that no immunity is demonstrable, since reinfection occurs in every way similar to the first infection. Nevertheless, it seemed pertinent to determine whether the blood of patients contains antibodies capable of preventing or diminishing the activity of the infectious agent as measured by its infectivity in monkeys.

Accordingly, conjunctival scrapings from patients of verified infectivity were suspended in veal infusion broth and mixed with sera, whole blood, or plasma. In some experiments the blood constituents were derived from the patients, and in others from normal individuals. In general, the mixtures were kept at room temperature 3 to 4 hours, although occasionally the period of fixation was lengthened to as long as 12 hours. In a few trials, the specimens were incubated at 37°C. for one half hour only, since it was believed that longer periods of incubation might have an injurious effect on the agent *per se*. The mixtures were then inoculated in monkeys. The results demonstrated clearly that blood from patients with trachoma possesses no demonstrable substance that is capable of neutralizing or inactivating the infectivity of certain human tissues for monkeys. The indications are, therefore, that the repeated suggestions made in the past on therapy with auto-inoculations of blood or serum are not supportable by experimental evidence.

Discussion

The experiments described in the present communication accentuate in another way the unusual nature of the infectious agent of trachoma. While it is true that most viruses vary in one respect or an-

other from the generalized concept, the agent of this disease combines in its make-up more of the exceptional and less of the common attributes of viruses. Highly tissue-selective, the agent of trachoma is capable of initiating infection only in the conjunctiva of man and monkey, so that intravenous or subcutaneous injections of grattaged material, as practiced even in man by Nicolle, Cuénod, and Blaizot,[16] Trabut, Negre, and Reynaud,[17] and others, are without effect. In spite of its small size (less than 0.6 μ), as demonstrated by Thygeson, Proctor, and Richards[18] and ourselves,[5] the infectious agent is difficult to filter, and, moreover, it has not been possible to cultivate the virus outside of the animal body. While Poleff[19] reports that rickettsiae may be propagated from trachomatous eyes by means of tissue culture, there is, as yet, no evidence to show that the rickettsiae thus cultivated are specific of trachoma or are capable of inducing the experimental disease. Our own experiments,[20] as well as preliminary studies carried out by Thygeson,[21] failed to contribute evidence that the agent of trachoma, regardless of its organic nature, is cultivable in tissue cultures. Moreover, the basophilic and heterogeneous consistency of the cytoplasmic inclusion body in epithelial cells, its closely associated, acidophilic, coccoid elementary body, its carbohydrate matrix,[22] its bile solubility, referred to above, are a few aberrations from the conception usually entertained regarding the structure and appearance of inclusions accompanying virus diseases.

The present study contributes further evidence of the unusual nature of the trachomatous virus. Unable to resist changes in environment generally considered of a minor degree, it cannot preserve itself under conditions of drying, moderate heat, and other physical agents. Its tolerance for chemical substances is very low, so that it did not survive contact with a single one of those employed in this study. At this point, reference must be made to experiments performed by Stewart,[1] who showed that an acidity of pH 6.4 has a destructive action on the infectivity of a given tissue. The indications are, therefore, that the virus of trachoma is physically fragile, just as biologically it is of such low virulence or invasiveness as to require repeated contact or massive dosage for dissemination. To what extent, however, chemical agents, as some of those suggested in this report, may be of therapeutic service remains for future investigation to disclose.

Lack of demonstrable active immunity following the experimental disease in monkeys indicates that the virus of trachoma is a poor antigen. In fact, it has been found convenient in this laboratory to use recovered animals as of proved susceptibility.[11] Attempts to detect antibodies in the blood of patients by neutralization tests also confirm this opinion. This does not imply, however, that the virus is not an antigen. Clinical observation reveals that a large variety of localized conjunctivitides due to organisms of recognized antigenic power, when present under other conditions, are not accompanied by an immunity to the organism in question. It may well be, therefore, that lack of antibody response in trachoma is due, first, to a localization of the virus without invasion, and second, to an incompetency on the part of the tissues involved to form sufficient antibodies for detection by the usual methods.

Summary

Under the conditions of experimentation outlined, it has been determined that the virus of trachoma is unable to re-

sist environmental changes such as desiccation, freezing and thawing, and moderate heat. Consequently, it has not been possible to preserve the virus over an appreciable length of time by physical methods. So, also, preservation in glycerine has been unsuccessful.

In the presence of chemical substances, such as bile, gentian violet, tartar emetic, silver nitrate, phenol, and cocaine, the infectious agent of trachoma is rapidly inactivated.

Antigenically, the infectious agent appears to be ineffectual, since it stimulates neither antibody formation nor increased resistance during active infection.

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TENON'S-CAPSULE TRANSPLANTS IN SURGERY OF THE OCULAR MUSCLES, WITH ESPECIAL REFERENCE TO POSTOPERATIVE DEVIATIONS WITH ADHESIONS BETWEEN THE MUSCLES AND THE EYEBALL*

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The fact that secondary deviations with marked limitation of motion in the field of action of the muscle which has been operated upon are frequently difficult to correct has long been recognized. In operating upon patients with postoperative deviations following muscle operations, adhesions between the muscle and the eyeball have been observed as far back as 20 mm. from the cornea. These adhesions may account for the fact, which has previously been reported,[1] that resection of a muscle may lead to limitation of motion in the field of action of the muscle operated upon.

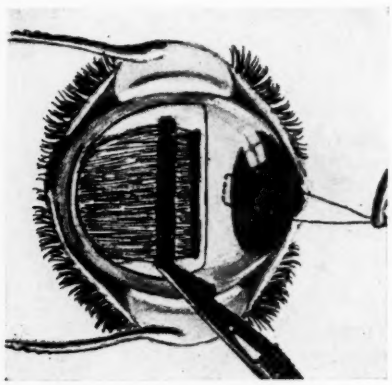

Fig. 1 (Berens). A vertical incision is made along the semilunar fold in order to expose the medial rectus. Tenon's capsule is not disturbed, and a muscle forceps without teeth or pins is passed beneath the muscle.

Because of one or two failures to correct secondary deviations in patients upon whom I have operated, also because other surgeons have been unsuccessful, investigations were undertaken to discover a substance that could be placed between the muscles and the sclera. Although gold and several other substances were suggested, Tenon's capsule was finally selected because of my experience with Tenon's-capsule grafts in glaucoma.[2] The following technique was evolved and used in three cases:

TECHNIQUE

If the medial recti are operated upon, they are exposed by an incision along the

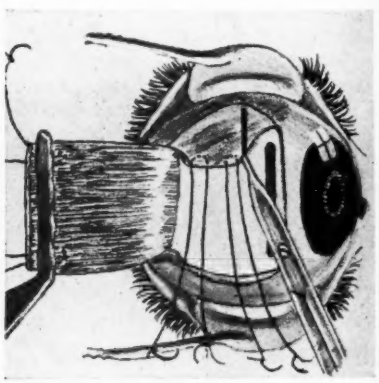

Fig. 2 (Berens). The muscle is severed from its insertion, and the fibers lying between the forceps and the insertion are excised. Two double-armed sutures of 10-day, 0000 chromicized catgut are passed through the muscle from the scleral surface and then through the holes in the forceps. Two double-armed sutures of plain 0000 catgut are passed through the border of Tenon's capsule. The incision in Tenon's capsule is indicated by a dark line.

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semilunar fold. To expose the lateral recti, a vertical incision is made at the external canthus. The muscle is picked

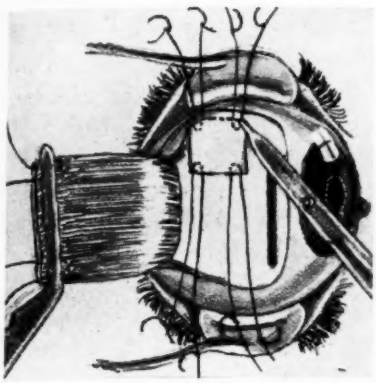

Fig. 3 (Berens). Two additional double-armed plain, 0000 catgut sutures are passed through Tenon's capsule and the graft is freed by means of a Stevens scissors along the dashed line.

up with a special muscle forceps that has no teeth or pins,[3] with which there is less danger of tearing the muscle fibers and making new adhesions. The muscle is

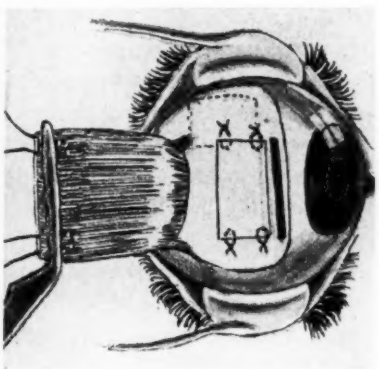

Fig. 4 (Berens). Tenon's capsule is severed, reversed, and sutured with episcleral sutures to the rough scleral area where the medial rectus was formerly adherent.

freed from the underlying sclera, and, if desired, resection is performed.[4] Through the jaws of the forceps four double-armed 0000 ten-day chromic catgut sutures* are introduced, extending to the cut end of the muscle. The muscle is then drawn nasally, and Tenon's capsule is

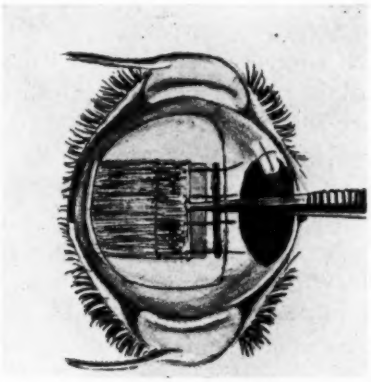

Fig. 5 (Berens). The medial rectus is drawn over the graft by means of traction with fixation forceps after passing the sutures through the muscle stump.

undermined on one side of the muscle. Two double-armed 0000 catgut sutures are passed through the edge of Tenon's capsule, about 10 mm. apart. Incisions are made on each side of these sutures in

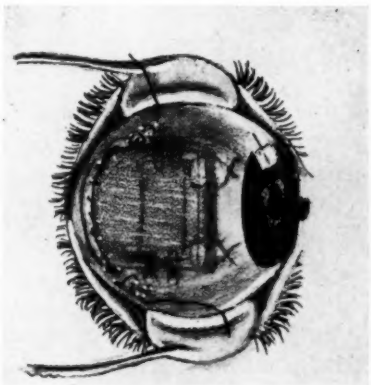

Fig. 6 (Berens). The conjunctival wound is closed with a running suture of plain catgut. The muscle and the graft may be seen in outline through the conjunctiva.

order to prepare a piece of Tenon's capsule, 10 mm. in diameter, for excision.

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Two sutures are then introduced 10 mm. from the other sutures, and the piece of Tenon's capsule excised on the other side of the newly introduced sutures.

The graft is reversed, so that the smooth scleral surface is placed upward toward the muscle and the more vascular surface toward the sclera. The graft is sutured into position over the denuded areas of roughened sclera by attaching it to the sclera with four episcleral sutures. The four sutures inserted in the muscle are now passed through the episcleral tissue or through the old stump at the point selected to produce the effect desired. The muscle is then drawn forward with forceps as the eyeball is rotated toward the severed muscle.

The sutures are firmly tied with three knots and cut off close to the third knot. The conjunctiva is closed with a running 0000 plain-catgut suture starting and ending with two extra bites through the conjunctiva. Metaphen ointment (1:2500) is placed between the eyelids and a light compressing dressing is applied.

Postoperative treatment

The dressing is removed on the day following operation. Holes are cut in a Ring mask in front of both eyes, in order to permit the patient to see as well as to immobilize the eyes.

Report of cases

Case 1. Postoperative secondary divergent strabismus with great limitation of adduction. On June 13, 1934, Mr. P. G. was admitted to the Orthoptic Training Department of the New York Eye and Ear Infirmary, complaining of constant diplopia. In February, 1932, a recession of the right medial rectus had been performed. The patient's visual acuity was: Right eye 20/50; left eye, 20/20. His deviation at 6 meters was exotropia 5$^{\Delta}$ and right hypertropia of 6$^{\Delta}$, and at 25 cm. right hypertropia of 6$^{\Delta}$ with marked limitation of adduction.

On July 7, 1934, another ophthalmologist performed advancement of the medial rectus of the right eye. Postoperatively, at 6 meters the patient had exotropia of 8$^{\Delta}$ and right hypertropia of 6$^{\Delta}$, while at 25 cm. there was exotropia of 13$^{\Delta}$ and right hypertropia of 6$^{\Delta}$. Although he appreciated crossed diplopia, the patient was unable to superimpose images and had great limitation of adduction. These findings were checked by means of special diplopia spectacles, the Worth four-dot test, and on a major amblyoscope (i.e., orthoptoscope). In an attempt to overcome abnormal retinal correspondence, orthoptic training was prescribed.

On June 5, 1936, the patient was admitted for further surgery, and advancement of the medial rectus was performed. Preoperatively, the patient's right eye showed limitation of adduction, with momentary fusion on his true projection. Resection and advancement of the medial rectus of the right eye was performed. Sutures were passed through the medial rectus, and the muscle was freed from the sclera at its attachment 5 mm. posterior to the original insertion. Adhesions of the muscle to the sclera were found 14 mm. from the limbus. A 4-mm. piece of the muscle was excised, and the muscle advanced to 6 mm. from the cornea. Postoperatively, the patient's deviation was: At 6 meters, exotropia of 20$^{\Delta}$, right hypertropia, of 4$^{\Delta}$; and at 25 cm., exotropia of 18$^{\Delta}$ and right hypertropia of 2$^{\Delta}$.

On June 24, 1936, the patient had imperfect stereopsis, but could overcome his vertical deviation on the orthoptoscope. On July 13, 1936, the patient's refractive error was: R.E., +3.00 D. sph. with a 1½$^{\Delta}$ prism, base down; L.E., plano combined with 3$^{\Delta}$ prism, base in, and a 1½$^{\Delta}$ prism, base up. By means of the

Tschermak test, the patient could superimpose when his head was rotated approximately 10 degrees toward the left.

On October 23, 1936, a 5-mm. retroplacement of the right lateral rectus was performed. Catgut sutures were used throughout. Postoperative examination revealed exotropia of 10Δ and right hypertropia of 4Δ at 6 meters, and at 25 cm. exotropia of 10Δ and right hypertropia of 4Δ. Crossed diplopia was appreciated but neither superimposition nor fusion was obtained. Vision in the right eye was 20/70 and in the left eye 20/20.

On February 19, 1937, because of diplopia and limitation of adduction (10 degrees temporal to the midline), the patient returned for further surgery. Resection of the medial rectus with transplantation of Tenon's capsule was performed.

Technique of Operation. A conjunctival incision along the semilunar fold was made. A muscle clamp was applied 8 mm. from the attachment of the muscle. A 4-mm. piece of the muscle was excised between the clamp and the insertion. Two double-armed chromic catgut sutures were inserted through the clamp at the end of the muscle. Adhesions were found between the muscle and the sclera, extending 20 mm. from the cornea. A Tenon's-capsule graft 10 mm. in diameter was excised near the lower border of the muscle; the graft was reversed, placing the smooth surface toward the muscle, and sutured to the sclera, covering the roughened areas of the sclera. A running plain-catgut suture was inserted to close the conjunctival wound.

Following this operation the patient had esotropia of 10Δ at 6 meters, and at 25 cm. esotropia of 6Δ. He fused the Tschermak test, although crossed diplopia was present. The patient was able to overcome false projection, and appreciated second-grade binocular vision on his true projection by means of flashing and retinal massage on the major amblyoscopes.

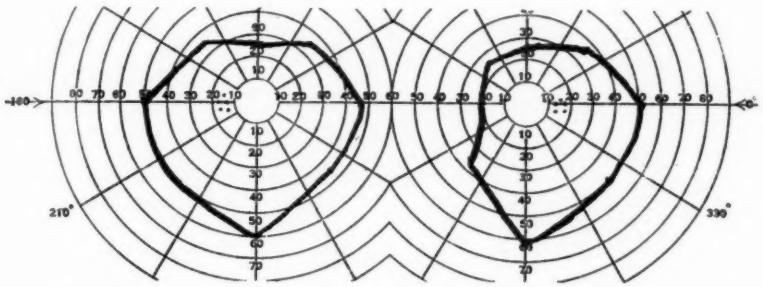

Fig. 7 (Berens). Mr. P. G.: Postoperative field of rotation—corneal-reflex method taken on a Ferree-Rand perimeter with an ophthalmoscope light, May 8, 1937. Superior altitudinal defect caused by overhanging brows.

On May 8, 1937, the patient could adduct the right eye 10 degrees nasally to the midline.

Discussion. In spite of three operations to correct postoperative divergent strabismus, this patient had adduction limited to 10 degrees temporal to the midline and annoying diplopia. After transplantation of Tenon's capsule he was able to adduct the right eye 10 degrees.

Case 2. Postoperative divergent strabismus of the right eye with marked limitation of adduction following several operations. Mr. V. C., aged 31 years, was

first examined on October 16, 1936, for divergent strabismus. He complained that his eyes diverged, the right almost constantly, and that he could read very little because he fell asleep after 15 or 20 minutes. His brother had esotropia. The patient had severe constipation, and in 1923 an appendectomy had been performed.

As a result of an operation upon his right eye for convergent strabismus when the patient was nine years of age, his eyes diverged. However, in 1923, the eyes were operated upon again, and then converged. Following another operation, which was performed in order to correct the esotropia, divergent squint developed. No record of the exact procedures performed at the previous operations was obtainable. Vision without correction in the right eye was 2/500 (eccentric fixation), and 10/200 with the following correction: —2.75 D. cyl. ax. 20°. In the left eye vision with correction (+.25 D. sph. ⌯ +0.50 D. cyl. ax. 110°) was 20/20+. The patient could not read 6 M. type with the right eye, but with the left eye he read 300-mm. print at 100 mm. Without correction, muscle findings as tested by means of the screen and parallax test were: exotropia of 84Δ at 6 M. and 25 cm.

On October 29, 1936, because of poor fixation with the right eye it was impossible to obtain reliable findings with the screen test in the four corners of gaze. However, from the rotation of his eyes, the following diagnoses were made: paresis of the right superior rectus; slight spasm of the left inferior oblique, and complete loss of function of the right medial rectus. Adduction of the right eye was limited to 10 degrees temporal to the midline.

On October 30, 1936, resection and advancement of the medial rectus with transplantation of Tenon's capsule was performed. Upon exposing the muscle by means of a 12-mm. incision along the the semilunar fold, much scar tissue was found. The muscle was freed from the underlying sclera to which it was attached 15 mm. from the cornea. A piece of Tenon's capsule, 10 mm. in diameter, was sewed to the sclera over the site of the adhesions. After resecting a piece of muscle, 6 mm. in length, the muscle was advanced to its original insertion, 5.5 mm. from the cornea, by means of two double-armed 10-day chromic catgut sutures.

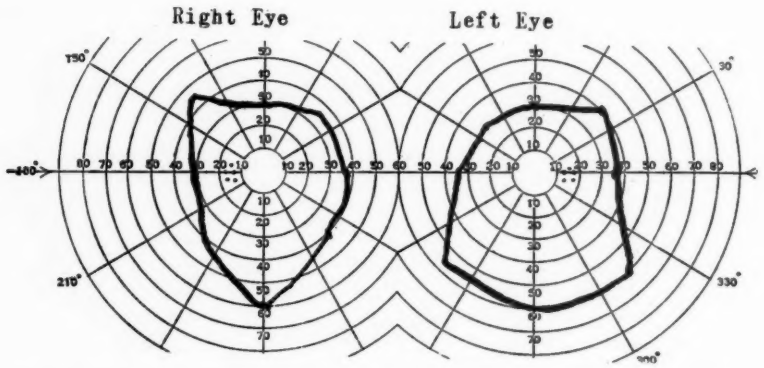

Fig. 8 (Berens). Mr. P. G.: Postoperative field of monocular fixation; altitudinal defect due to overhanging brows. Patient complained of monocular diplopia.

On November 11, 1936, the patient's eyes were cosmetically straight and apparently moved well together. Ten days later, vision in the right eye without correction was 15/500; with a —2.75 D. sphere, vision in the right eye was 5/200. The right pupil was slightly dilated. With the screen and parallax test there was a left hypertropia of 3Δ at 6 M.

On March 25, 1937, at 6 M. exotropia of 3Δ and left hypertropia of 5Δ were present, while at 25 cm. there was exotropia of 4Δ and right hypertropia of 5Δ. The patient had excellent adduction, approximately 30 degrees.

On April 21, 1937, the patient adducted the right eye 28 degrees nasally when measured with the tropometer. Lack of sufficient vision prevented measurement of the field of fixation of the right eye. Rotation of the right eye, as measured with the perimeter, and central corneal reflex indicated adduction of 28 degrees. There was left hypertropia of 2Δ at 6 M. but there was no lateral deviation.

On May 19, 1937, muscle findings at 6 M. were left hypertropia of 2Δ and at 25 cm. exotropia of 3Δ, left hypertropia of 2Δ.

Case 3. Postoperative exotropia with limitation of adduction, the result of an operation for esotropia. M.C., aged 12 years, was admitted to the Department of Motor Anomalies of the New York Eye and Ear Infirmary on May 15, 1936. Bilateral recession of the medial recti had been performed in 1932, advancement of the left medial rectus in 1933, and readvancement of the medial rectus of the left eye for secondary divergent strabismus in 1934.

With the screen and parallax test there was exotropia of 61Δ, left hypertropia of 8Δ without correction at 25 cm. Visual

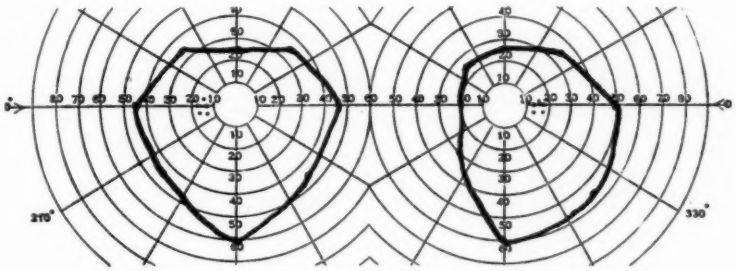

Fig. 9 (Berens). Mr. M. C.: Field of monocular fixation following Tenon's-capsule transplant.

acuity was: Right eye, 20/30; left eye, 20/30. He accepted right eye +0.25 D. sph. ⌯ +0.50 D. cyl. ax. 85°, and left eye +2.25 D. sph. ⌯ +0.50 D. cyl. ax. 85°. Objectively tested, he alternated fixation with the screen test and suppressed the vision of the left eye when tested by means of special diplopia spectacles.[5]

The patient was found to have a complete paralysis of the left medial rectus (limitation of adduction to 10 degrees temporal to the midline) and exophthalmos.

On June 5, 1936, advancement of the left medial rectus was performed. Postoperative examination revealed exotropia of 46Δ and right hypertropia of 4Δ at 6 M. and at 25 cm. an exotropia of 63Δ, and a right hyperphoria of 4Δ (screen test with prisms). With the orthoptoscope he could neither superimpose nor fuse. On October 30, 1936, bilateral retroplacement of the lateral recti was performed. Fol-

lowing these operations, adduction of the left eye was still limited to 10 degrees temporal to the midline.

On April 2, 1937, the muscle findings were: at 6 M. exotropia 43$^{\Delta}$, left hypertropia 4$^{\Delta}$; at 25 cm. exotropia 47$^{\Delta}$, left hypertropia 5$^{\Delta}$.

On April 9, 1937, the patient returned for further surgery. A Tenon's-capsule transplant combined with resection and advancement of the medial rectus of the left eye was performed.

Operative procedure and findings at operation: The conjunctiva over the muscle was incised along the semilunar fold where it had become thickened from two previous operations. The conjunctiva was adherent to the underlying muscle and Tenon's capsule. The muscle was freed from its main insertion, which was found to be firmly adherent to the sclera 11 mm. from the cornea, and a toothless muscle clamp was placed beneath the muscle. Adhesions were found as far back as 20 mm. from the cornea. A piece of Tenon's capsule 10 by 15 mm. was freed from the conjunctiva and sclera in the region of the inferior-rectus muscle and excised after placing two double-armed 0000 plain-catgut sutures through the four corners. The graft was reversed and placed lengthwise beneath the muscle. A piece of muscle 5 mm. long, which was fibrosed and had been adherent to the sclera, was excised. Two double-armed chromic 0000 ten-day catgut sutures were placed through the end of the muscle and the forceps. The muscle was brought forward and sutured to the episcleral tissue 4 mm. from the cornea. Then the conjunctiva was closed with a running suture of plain 0000 three-day catgut.

On April 20, 1937, vision in the right eye was 20/30 + 3 and in the left eye 20/30. The following muscle findings were recorded: esotropia of 3$^{\Delta}$ and left hypertropia of 12½$^{\Delta}$ at 6 M.; at 25 cm. esotropia of 3$^{\Delta}$ and left hypertropia of 14$^{\Delta}$. By means of the synoptiscope on the patient's true projection there was an esotropia of 4$^{\Delta}$ and a left hypertropia of 6$^{\Delta}$. The patient had neither superimposition nor fusion on the synoptiscope and he suppressed the vision in his left eye when measured by means of special diplopia spectacles and the Worth test.

The postoperative field of monocular fixation of the right eye was, abduction 35°, adduction 35°, upward 30°, downward 60°; and of the left eye, abduction 35°, adduction 35°, upward 30°, and downward 60°.

Summary

An operation for the correction of postoperative deviation of the eyeball due to adhesions between the muscle and the sclera is described. The main feature of the operation is the attempt to prevent the re-formation of adhesions by the insertion of a piece of Tenon's capsule over the roughened sclera beneath the muscle. The operation was performed on the eyes of three patients with secondary divergent strabismus following operation for esotropia, with satisfactory results. In two of these patients other surgeons had attempted to correct the postoperative exotropia. In one of these cases, resection and advancement without Tenon's-capsule transplant had been performed on the medial rectus by me, but the result was unsuccessful, and a 6-mm. retroplacement of the lateral rectus was then performed, which failed to correct the exotropia, and the limitation of adduction was unchanged.

Tenon's-capsule transplant may be performed with or without resection of the muscle which lies over the graft. If the deviation is great, as it usually is in secondary divergent squint, the lateral rectus should be receded 5 to 6 mm. if the

patient's eye is not amblyopic and there is a possibility of obtaining satisfactory binocular vision. A 7-mm. retroplacement of the lateral rectus may be performed if the patient's eye is extremely amblyopic and the deviation is great. A fourth patient has been operated upon recently for postoperative exotropia in whom a stitch abscess had developed. Tenon's capsule, which was thickened under the muscle, was merely freed laterally so that it could be drawn toward the cornea, where it was stitched to the sclera to cover the roughened area. A careful search of the literature has failed to reveal that either of these operations has previously been described.

Conclusions

1. Tenon's-capsule transplant, which has been performed on three patients, may prove to be efficacious for the surgical correction of postoperative strabismus in which adhesions have formed between the muscles and the sclera.

2. The operations have not been performed for a sufficient length of time to allow conclusions to be drawn as to the final results.

3. Experiments will have to be made before the efficacy and exact method by which this operation achieves results may be finally ascertained.

35 East Seventieth Street.

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NOTES, CASES, INSTRUMENTS

A SIMPLIFIED, PORTABLE GONIOSCOPIC UNIT*

ISAAC HARTSHORNE, M.D.
New York

For examination of the angle of the anterior chamber Troncoso's[1,2] gonioscope is ideal except that it is not binocular. Furthermore, it is no longer manufactured. Troncoso and Castroviejo[3] of New York City and Otto Barkan[4, 5, 6, 7, 8] of San Francisco have greatly advanced the use of the binocular corneal microscope, as made for the slitlamp, for gonioscopic examination. O. Barkan has called this procedure binocular microgonioscopy.[7]

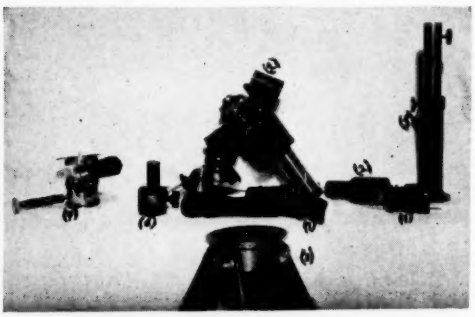

Fig. 1 (Hartshorne). 1. General Electric night-lamp and bulb. 2. Telescoping light attachment with hinge and lock attached to corneal microscope. 3. Tripod with head-locking lever. 4. Camera tilting-table "Panrite." 5. Telescoping connecting sleeve. 6. Right-angled collar. 7. Connecting wire for current supply.

Castroviejo and also Bruce[9] have advocated holding the binocular microscope in one hand, and in the other an ordinary ophthalmoscope lamp for illumination. This method can be used for a quick observation of the angle, but the binocular microscope is too heavy to hold steadily, and for study or demonstration there must be a fixed support for the apparatus. Besides, this method requires extra assistance or else leaves only one hand free to hold the heavy binocular microscope.

It has been my desire for some months to assemble a simple, practical, portable, and comparatively inexpensive gonioscopic unit. First, therefore, what to do for illumination by a lamp attached to the microscope?

Castroviejo[10] has developed a lamp that is attached to the turret of the binocular microscope of the slitlamp. This lamp was made by Zeiss, and this firm offered to make one for me for about $100.00.

In September, 1937, Fine[11] of San Francisco described an excellent lamp. This lamp seemed as simple as possible and was attached to the binocular microscope by two screws in the small plate on top of the turret between the two eye pieces. This device also cost too much.

The lamp presented herewith (fig. 1) is a ready-made General Electric night-lamp. Costing twenty-five cents, it is made with housing, switch, and connection for wiring, to plug into the regular house current and needs no transformer. With the use of this lamp most of the expense in making Fine's lamp was eliminated. The other details of this illuminating device—length of tubes and sleeves and +30 D. sph. condensing lens—were copied from Fine's description.[11] At its focal point this light gives 25 foot-candles of illumination, which is sufficient for examination of the angle. Should more light be needed, a Bausch and Lomb or some other hand slitlamp can be used in conjunction with this lamp.

[*Author's note.* The lamp herewith described and presented and shown in the figures has been

* Presented before the Section of Ophthalmology of the New York Academy of Medicine, November 15, 1937.

considerably improved in the following manner:

By using a higher grade lamp (6 watts); chromium plating the inside of the projecting sleeve; inserting the lampsocket and lamp into the side of the projecting sleeve at right angles to it; and placing a metal mirror reflector behind the lamp at the end of the projecting sleeve, the foot-candle power has been increased from 25 to 50.

A further improvement is being undertaken: By the use of an automobile-lamp bulb and an inexpensive resistance cord that plugs into the regular (either D.C. or A.C.) house current, the foot-candle power will be increased to about 100.]

It would be superfluous to describe again, at this time, the splendid gonioscopic apparatus developed by O. Barkan.[6] This new outfit is presented merely for a wider usage.

The tripod here shown has a screw top for adjusting a camera or other apparatus to it and a locking handle underneath its head. If desired, a heavier, more adjustable, and more expensive tripod can be used.

To make the base of the apparatus adaptable in two planes there is added to the tripod a camera tilting-table (Fig. 1, 4) called a "Panrite" table. This rotates in the horizontal plane and tilts forward and backward in the vertical plane. Each of these motions is controlled by a separate lock screw with a handle. As found on the market, one of these handles must be shortened.

To provide an extension a metal tube (fig. 1, 5), five inches long was made, to be screwed to the tilting-table top and held fast by the lock screw under the tilting-table. This tube has a telescopic sleeve that can be extended four inches and has a lock screw to hold fast the sleeve and also one to fasten whatever is inserted into it. This telescopic sleeve could be made longer to provide a wider sweep for the whole outfit.

An additional attachment (fig. 1, 6) was made to slip into the above-mentioned sleeve and with a collar to hold the binocular microscope at right angles to the other supporting parts. With this latter attachment the binocular microscope can be rotated a full 180 degrees or more on its axis.

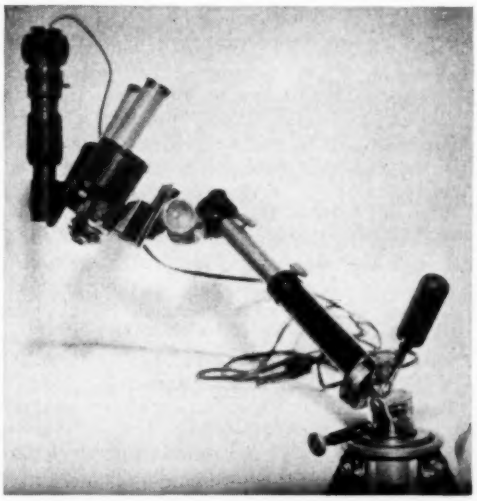

Fig. 2 (Hartshorne). Assembled outfit adjusted at a right-angle.

A lock washer and the small set screws were removed from the swivel-joint of the binocular microscope, thereby enabling the microscope to be tilted forward or backward a full 180 degrees in the vertical plane.

It is possible by loosening one or more of the lock screws to change the position and angle of the binocular microscope at will and finally to fix it for study or demonstration. With a diagnostic gonioscopic contact lens and this outfit (fig. 2) the examination of the angle becomes quite easy.

The total cost of the complete unit,* not including the binocular microscope or diagnostic contact lens, was (as numbered in figure 1): (1) General Electric night-lamp and bulb, $.25; (2) telescop-

* The mechanic who gave valuable suggestions and also made all the necessary parts is Mr. Adam Archinal, 305 West Fifty-sixth Street, New York City.

ing light attachment with hinge and lock attached to corneal microscope, $16.00; (3) tripod with head-locking lever, $8.00; (4) camera tilting-table "Panrite," $5.00; (4) shortening handle of tilting-table, $2.50; (5) telescoping connecting sleeve, $5.50; (6) right-angled collar, $8.00; (7) connecting wire for current supply, $.25; total $45.50.

30 West Fifty-ninth Street.

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THERMOPHORE THERAPY OF A CASE OF KERATITIS

THOMAS H. ODENEAL, M.D., F.A.C.S.

Gloucester, Massachusetts

Since Dr. Shahan perfected the thermophore, many excellent results have been reported in the treatment of various diseases of the eye. For removing growths from the eye the thermophore has no equal. It has been so successful in my hands for this purpose that I determined to try it on apparently hopeless cases, and of these I wish to report on two separate conditions in the same patient and the same eye.

The patient, an active, wealthy man in his eighties, who had been a summer patient of mine for years, consulted me in the fall of 1932 on account of decreasing vision in his left eye. His right eye had long been blind from interstitial degeneration of the cornea. The left eye presented a white granular patch starting in the temporal conjunctiva and extending into the cornea. Another patch extended 3 mm. from the lower limbus. The vision was 20/20.

He was given Brown ointment (cod-liver-oil ointment) for use in the eye, small doses of insulin (diabetes was not present), and cod-liver oil internally. A diagnosis of xerosis was made, although the conjunctiva was not dry. The vision steadily decreased under further encroachment of the process until one month later vision with correction had dropped to 20/50. Local treatment consisted of scraping the areas and touching them afterwards with 20-percent trichloracetic acid. There was prompt return of the process.

Since it was the custom of the patient to return to New York on October 1st, I gave him a treatment with the thermophore, employing 130 degrees of heat for one minute. Several days after the treatment, there was no change in the process. He returned in December for further treatment. At this time his vision was limited to the ability to detect hand movements. Insulin in small doses was given daily to increase his assimilative powers and to strengthen him. Cod-liver oil internally and Brown ointment in the eye were continued. Small doses of strychnine were also administered. Several applications of heat were made to the two corneal areas at weekly intervals. The first application was 130 degrees; this temperature was increased to 140 degrees. By February 10th, the patches had cleared away entirely, with formation of clear transparent corneal stroma. Vision at this time was 20/40 with a +2.00 D. sphere, and the patient read moderate-sized print without difficulty. The fundus was normal as was also the tension.

The patient spent the remainder of the winter in Florida and returned in the summer with the same degree of vision. The disease was apparently cured. In September of that year his vision had improved to 20/30 with +2.50 D. sphere and remained thus until June, 1934, when on his return from a Florida trip two new patches appeared in new locations. These were removed in three treatments at 140 degrees. There was no further involvement; the vision remained the same.

In June, 1936, he returned to me with a small patch of brownish discoloration in the stroma of the cornea extending from below to cover the lower border of the pupillary area. For lack of anything better to call it I diagnosed this as a corneal degeneration. It was somewhat similar to the type described by Wright of India, flat with bullous formations. A brownish pigmentation involved the outer third of the corneal stroma. In places the cornea appeared to be thinner than normal. The anterior chamber, unlike that of the right eye, was of normal depth. There was a marked exfoliation of the lens capsule with the characteristic flakes on the pupillary margin. The lens was relatively clear. The fundus was seen fairly well although the pupil was not dilated. The disc appeared to show a very suspicious cupping, particularly toward the temporal margin. The field of the left eye was full and the central field showed no abnormality of the blind spot despite the suspicious cupping.

Vision at this time in the left eye was 20/100. The patient had been under the care of his New York ophthalmologist, who told him the condition was incurable. Tension in the right eye was 48 mm. Hg, and in the left eye 23 mm. Hg (McLean). He was now blind in the right eye from the same affection, and there was a diffuse clouding of the cornea in addition.

On examination one year previously a small point of brown pigmentation 2 mm. in diameter had been noticed below the pupil in the corneal stroma, although the vision at that time was unaffected. The brown discoloration had advanced to cover the pupil and was 8 mm. in diameter, the edges perfectly regular and the discoloration still round in shape as it had been when first noticed. The patient had been taking vitamin capsules ABD the entire year without benefit.

Vision steadily decreased to the ability to count fingers at five inches. Several treatments were given with the thermophore at 152 degrees of heat without any effect. As 160 degrees of heat has been the highest recommended for treatment of the eye I was hesitant to make an application exceeding this limit, but was cer-

tain that it would require considerably more to remove the process.

After anesthetizing a cat I burned its cornea with a 7-mm. applicator, employing 180 degrees for 1½ minutes. There was regeneration of the cornea within two weeks, although the eye was inflamed for six weeks afterwards. After this experiment I informed the patient that if he was willing to undergo the ordeal, I would attempt to remove the process, although the result was extremely doubtful, for he might have scarring afterwards. Since he was blind already he begged to have the experiment performed, especially since he did not wish to undergo an operation for optical iridectomy.

A 7-mm. applicator at 178 degrees was applied to the cornea for one minute, raising it two or three times, for I was afraid of such intense heat to the lens. This treatment was followed by a destructive burn and the eye was two months in healing. The cornea healed slowly without the brown pigmentation. A keratitis persisted up to the time when the patient left for Florida in October, three months after the treatment.

On his return in the summer the cornea was transparent and no evidence of the brownish pigmentation could be discovered. His vision had not improved to the point it should have and on examination I discovered a detached retina. With a correcting lens the vision was 20/200. The detachment could have occurred at any time within the year after the treatment. Whether it followed the treatment could not be determined, but the loss of vision was not due to the detachment since it came on gradually. The lens remained perfectly transparent, therefore the heat did not affect it.

When we consider the age of this person and his weakness, the outcome is especially astonishing. The case teaches us that radical treatment may bring about a cure in apparently hopeless conditions.

SOCIETY PROCEEDINGS

Edited by Dr. H. Rommel Hildreth

NEW ENGLAND OPHTHALMOLOGICAL SOCIETY

January 19, 1937

Dr. James J. Regan, *presiding*

Lacarrère diathermy needle

Dr. Edwin B. Dunphy said that this type of needle could be used for any diathermy operation.

Parinaud's conjunctivitis

Dr. Virgil G. Casten presented a 40-year-old housewife who found that she had enlarged glands on the neck and around the ear. She was seen by Dr. P. H. Thompson, who made the diagnosis of Parinaud's conjunctivitis, and was referred to the Massachusetts Eye and Ear Infirmary for study and treatment. Bacteriology studies confirmed the diagnosis. Dr. Verhoeff stated he had never seen the glands break down.

The patient was presented because she showed a typical condition of the disease.

The utilization of mucous-membrane grafts in ophthalmic plastic surgery

Dr. Edmund B. Spaeth read a very interesting paper on this subject which was published in this Journal (September, 1937, p. 897). Motion pictures and lantern slides were shown in conjunction with the presentation of the paper.

Discussion. Dr. V. H. Kazanjian stated that there are bound to be some degenerative changes when the skin graft comes in contact with the membrane. He further stated that one can obtain a good deal of mucous membrane from the mouth. The color of the mucous-membrane graft on the eyeball is, of course, objectionable. Dr. Kazanjian showed slides of patients upon whom he had made skin grafts for early carcinoma of the lower lids for which he used membrane from the mouth. He retained good cul-de-sacs in these cases.

William P. Beetham,
Secretary.

NEW ENGLAND OPHTHALMOLOGICAL SOCIETY

February 16, 1937

Dr. James J. Regan, *presiding*

The autonomic pharmacology of the human eye

Dr. Abraham Myerson said that four drugs had been used in a routine research on the autonomic pharmacology of the eye. This research had followed along the lines which had been utilized in the laboratory (Research Laboratory, Boston State Hospital) for the investigation of the functions of other organs (sweating, lacrimation, flushing, heart action, blood pressure, gastrointestinal motility, gastric secretions, gall bladder, and urinary bladder action). The drugs were the following: mecholyl (acetyl-beta-methylcholine chloride), benzedrine sulphate (benzyl-methyl carbamine or beta-phenylisopropylamine), atropine sulphate (mandelic ester of tropine), and prostimin (dimethylcarbamic ester or oxyphenyl-trimethyl-ammonium methylsulfate).

The general principles of the use of these drugs were outlined briefly to the effect that mecholyl is a cholinergic drug, benzedrine adrenergic; prostigmin by paralyzing or inhibiting the esterases is a synergist of mecholyl; atropine by par-

alyzing or inhibiting the action of the cholinergic substances upon the reacting cell is in large measure a synergist of benzedrine.

Mecholyl (1 to 10 percent) constricted the pupil of the eye. The reaction to light was preserved until miosis was reached. The intraocular tension was diminished. The accommodation of the lens was increased for the proximal point; the palpebral fissure, narrowed; and there seemed to be enophthalmos, although this has not yet been confirmed.

Prostigmin (1 to 10 percent) had the same general effect as mecholyl. It operated, however, more markedly on the presbyopic eye to increase the accommodation of the lens for the near point. A subminimal dose of prostigmin and a subminimal dose of mecholyl produced marked effects, indicating the synergism of these drugs.

Benzedrine sulphate (1 to 10 percent) widened the pupil in sufficient concentration to the point of mydriasis. The reaction to light diminished with the strength of the solution used. The reaction to flashlight disappeared, but the reaction to sharp daylight was present, although this reaction was slow. The accommodation of the lens was definitely impaired for the proximal point and, in general, the effects upon the accommodation resemble those of atropine, although they were less marked. On the presbyopic eye benzedrine markedly impaired accommodation in dilute solution. The intraocular tension was increased. The palpebral fissure was definitely widened and this occurred before the pupil became dilated. Dr. Myerson further stated that the effects of atropine are well known and were not considered in detail here. However, atropine will completely check the effects of mecholyl. Given in advance, it prevents them. In subminimal doses (1:1000) it will produce a marked effect with a subminimal dose of benzedrine. These experiments definitely indicate its antagonism to the cholinergic drugs on the functions of the eye and the lid and its definite synergism with benzedrine sulphate.

Accommodation and the autonomic nervous system

Dr. Edith I. Cogan said that on examining a number of cases of unilateral Horner's syndrome, it was found that accommodation for near on the pathologic side was greater than that on the normal side, while distance adjustment was maintained least well on the accommodating side. It appeared, therefore, that lesions of the cervical sympathetic system enhanced near accommodation and interfered with distance adjustment. Accordingly, a certain amount of experimental evidence including electric and pharmacological excitation of the cervical sympathetics was presented and tended to show that in the normal eye the sympathetic system was responsible for the mechanism of distance accommodation as the parasympathetic is responsible for near accommodation.

William P. Beetham,
Secretary.

NEW ENGLAND OPHTHALMOLOGICAL SOCIETY

March 16, 1937

Dr. James J. Regan, *presiding*

Some less usual corneal conditions

Dr. Sanford R. Gifford discussed Mooren's ulcer or chronic serpiginous keratitis, ring ulcer occurring in trachoma, recurrent erosion of the cornea, and epithelial dystrophy of the cornea with especial reference to the mild type.

The two methods of treatment used

with success in Mooren's ulcer are, first, the use of a sliding conjunctival flap to cover the whole ulcer and an area of the cornea ahead of the ulcer; and second, keratotomy made tangential to the most active area of infiltration, the anterior chamber being reopened daily for a period of two or three weeks. Successful results were reported in five cases of Mooren's ulcer, four with keratotomy, and one with the sliding conjunctival flap.

For ring ulcer occurring in trachoma, keratotomy is also the treatment of choice. The procedure for recurrent erosion of the cornea, is to remove all loose epithelium from the cornea. The surface is treated with 10-percent trichloracetic acid, and a double dressing is applied for four days; the eyes never being opened during that time.

As to the mild form of epithelial dystrophy, treatment is not successful in effecting a cure, but the symptoms can be greatly relieved by the frequent use of a 1- to 3-percent solution of dionin, an alkaline wash such as 3-percent sodium bicarbonate, and a liberal supply of vitamin A in the diet.

Discussion. Dr. F. H. Verhoeff stated that very often it is difficult to tell a Mooren's ulcer from a tubercular eye condition, and he also questioned the cause of Mooren's ulcer. He had once seen a Mooren's ulcer which he thought was a tubercular condition and later found that the patient had died from pulmonary tuberculosis.

Dr. Hugo B. C. Riemer stated that he had watched various treatments for ulcer serpens but found that actual cautery was the best.

William P. Beetham,
Secretary.

SAINT LOUIS OPHTHALMIC SOCIETY

April 25, 1937

DR. LAWRENCE T. POST, *president*

OBSTRUCTION OF THE LACRIMAL PASSAGES IN THE NEWBORN

DR. JOHN F. HARDESTY said that surprisingly little is found in the literature on this subject and yet the condition occurs frequently enough to make it a problem of major importance in ophthalmological practice. Stephenson states that this condition was found in 1.75 percent of 1538 newborn infants.

The obstruction is usually of the nasolacrimal duct, but it is not unusual to find obstruction higher up. In some cases of high obstruction it would appear that the stricture is secondary to infection, but in some others the narrowing is congenital.

His own records show two children in one family in whom there was complete absence of one or more of the canaliculi. Occasionally one finds a simple occlusion of the punctum by a thin membrane the opening of which completely relieves the condition. It is generally claimed that the formation of tears does not begin until the fourth to eighth week of postnatal life, but this apparently does not hold true in all cases. He had been called to see cases in the hospital because of excessive lacrimation during the first two weeks of the baby's life.

Edward Jackson says that most of these obstructions are due to delayed development of the tear passages and can be expected commonly to terminate on spontaneous, complete, and permanent cures. He further quotes Rochon-Duvigneaud who found, in 30 newborn or stillborn children, three with the nasal orifice closed, and de Vlacovich, who in 19 autopsies on newborn children, found four cases in which the orifice connect-

ing the lacrimal drainage canal with the nose had not yet opened. William Zentmayer thinks most of these cases in the newborn arise from imperforation of the membrane between the nasal cavity and nasal duct.

Some of these cases can be explained on the basis of accumulated mucus in the nose, but in considering their clinical course and the embryological development of the lacrimal passage, it would appear that incomplete development offers a more satisfactory explanation in most instances.

Textbooks tell us that the nasolacrimal duct arises in the 12-mm. embryo as a ridgelike thickening of the epithelial lining of the nasolacrimal groove, which extends from the inner angle of the orbital fossa to the primitive olfactory fossa. This epithelial thickening becomes cut off from the surrounding epithelium and, as a solid cord sinks into the underlying mesoderm. At about the 16-mm. stage the connection of this ectoderm with the nasal cavity is broken, probably due to rapid growth of the mesoderm, but later this connection becomes reëstablished.

At about the 18-mm. stage the upper lid is partially formed and meets the lower to form the outer canthus. Soon after this, by a further infolding and elongation of the ectoderm above, the inner canthus is formed. The infolding of the ectoderm is necessarily continuous with its original infolding.

These ectodermic tracts of cells are broken, but now form the tracts which are later to become the lacrimal passages. The lids elongate to cover the eye and meet to fuse or adhere at the 37-mm. stage.

Ida Mann says that at about the 50-mm. stage the tracts of ectodermic cells begin to soften and soon true canalization begins. This apparently begins above and extends downward. Completion of canalization is normally complete shortly before birth, but in some cases it is delayed.

It is this occasional delay which appears to account for most cases of obstruction in the newborn.

In going over his office records, Dr. Hardesty found that he had had at least 60 cases of obstruction in the past five years, an average of one per month, and without exception infection was present in all. If left to themselves in practically all cases infection occurs sooner or later and then the problem of management is complicated by the formation of strictures, erosion of bone, and so forth.

In many cases of obstruction, particularly when seen early before infection has occurred, daily, gentle, but firm pressure over the lacrimal sac is often effective in establishing drainage into the nose. However, after infection had taken place, Dr. Hardesty had never found one in which drainage was established into the nose without at least repeated irrigations of the lacrimal sac. It is necessary to dilate and even enlarge the lower punctum, bearing in mind Jackson's warning that any operative interference should be done carefully so as to leave the puncta and canaliculi in as near normal condition as possible. Some writers warn of the danger of dilating and slitting the puncta, but he had never encountered any serious consequences. Should simple irrigation of the sac fail to establish drainage into the nose he finds it necessary to pass a probe carefully, but obviously this is never done until the sac is freed of pus by repeated irrigations. Some clinicians advocate waiting two or three years for spontaneous cures.

A. E. Ewing devised a small lacrimal syringe which is ideal for use in children. It consists of a gold needle attached to an ordinary medicine dropper by a cuff, or a

platinum needle fused into the end of a medicine dropper.

It has been his practice first to dilate the lower punctum enough to allow the insertion of a small needle to which is attached the dropper syringe of Ewing. In most cases, if thick pus is present, it is desirable to slit the punctum to allow the insertion of a large-tipped syringe. Boric acid or sodium biborate has been used daily as an irrigation solution. Some physicians prefer to instil antiseptics after lavage, but keeping in mind a young lady who has a permanent discoloration of the entire lower lid due to infiltration with a silver solution, he doubted the advisability of this. At any rate he has put his faith in simple cleanliness by lavage and has had no cause to regret it.

In 34 percent of his cases drainage into the nose occurred spontaneously during the course of lavage of the sac, while in 66 percent probing was required to establish this drainage. Of this larger group, one third required only one probing to establish permanent drainage. Of those requiring more than one probing, he believed that in some repetition was made necessary because of probing before the sac was entirely free from infection.

As regards the time element, 29 patients were discharged as cured within one week, 14 more under 2 weeks, and 9 more within the first month. The remaining 7 cases included two with total congenital absence of both lower puncta as well as obstruction lower down, and the others were not followed through to completion.

Discussion. Dr. William Luedde said he believed the earlier these cases are seen the better they respond to treatment. Indifference to the condition is a serious matter. He recalled a child whose parents had been told the condition would take care of itself. A lacrimal abscess resulted which extended into the lower lid and cheek. By simple cleanliness the abscess cleared up but left some deformity of the eyelid. He believes it is important not to probe during the active purulent state. A 2-percent solution of sodium biborate (because it is alkaline) will act as a better cleansing agent than boric acid. Many of these cases subside very promptly without probing if the lacrimal sac is washed out once or twice daily. He found himself completely in accord with what Dr. Hardesty reported.

Tuberculous papillitis with anatomical findings

Dr. Harvey D. Lamb read a paper on this subject which was published in this Journal (April, 1937).

Discussion. Dr. Vincent L. Jones said that the clinical course was that of an acute optic neuritis with iridocyclitis, terminating with a detachment of the retina and increased intraocular tension. The patient had been blind for one week before coming under observation. The pupil was dilated with difficulty. After several days the eye quieted down but without any improvement in vision. Then suddenly a massive detachment developed and the intraocular tension increased. Because the eye was totally blind, with detachment and increased intraocular tension, enucleation was advised.

The excellent pathological study of this specimen was simplified by the intimate clinical observations made by Dr. Lamb throughout the preoperative course. The end result as presented was the consummation of an unusual opportunity and a contribution of great value.

Leukemic infiltration of the retina treated with x rays

Dr. B. Y. Alvis read a paper on this subject which was published in this Journal (1938, v. 21, p. 31).

Discussion. Dr. J. V. Cooke said that the case reported presented several interesting and unusual features. First, the appearance of what appeared to be a chronic splenomyelogenous leukemia in a very young infant; second, the production of a bilateral blindness from a leukemic infiltration; and third, the partial return of vision after X-ray irradiation. Leukemic diseases are divided clinically into two main groups; mainly, acute leukemia, frequently called acute lymphatic leukemia and by far the more common type in childhood, and chronic leukemia, which is the usual type seen in adults. Acute leukemia is characterized clinically by pallor and asthenia, fever, more or less swelling and firmness of the lymph nodes, moderately enlarged spleen and liver, purpuric hemorrhages, pain in the long bones, and death in from a few weeks to a few months. Leukemic cellular infiltrations of a somewhat diffuse character occur in the viscera and, at times, local tumorlike masses of cells. One form in which such tumorlike infiltrations are found around the orbit as well as in other locations is called chloroma, and is relatively rare. The blood in acute leukemia shows characteristic changes of thrombopenia, anemia, decrease in granular leukocytes, and the presence of abnormal nongranular mononuclear cells resembling abnormal lymphocytes but probably originating in the bone marrow. Often, but not always, these cells are present in large numbers.

Chronic leukemia is of several years' duration, with asthenia and enlargement of the spleen as the only prominent symptoms, and is rare in children. Although a chronic lymphatic type occurs in elderly persons, the more common form is the chronic splenomyelogenous form in which the enlarged spleen is accompanied by large numbers of granular leukocytes of various types in the circulating blood. Although diffuse infiltrations of parenchymatous organs are common in chronic leukemia, localized tumor masses such as have been mentioned in acute leukemia are quite unusual.

Another point which deserves mention is that irradiation by X ray or radium is of temporary value in the chronic forms of leukemia, but is contraindicated in the acute forms, since it influences this latter type unfavorably.

From the foregoing it is apparent that the case reported by Dr. Alvis is unique in many respects. The occurrence of chronic splenomyelogenous leukemia in a young infant and the presence of what appeared to be a local infiltration of tumor cells in the eye with improvement after irradiation are most unusual. It is to be regretted that no morphological study of the tumor was possible.

H. Rommel Hildreth,
Editor.

AMERICAN JOURNAL OF OPHTHALMOLOGY

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GRADUATE STUDY

The Midwinter Graduate Course in Ophthalmology and Otolaryngology was held for the seventh time, and with its usual success. The 230 physicians who attended it were drawn chiefly from the Pacific Coast states, but other sections of the country were well represented. In ophthalmology the most important series of lectures was given by Professor Alfred Bielschowsky of Breslau and the Dartmouth Medical School, upon "The physiology and anomalies of the ocular movements." This series included 10 lectures, each supplemented by demonstrations of methods of clinical examinations and answers to the questions asked by his hearers.

For more than 40 years Carl Hess and Alfred Bielschowsky were associated as fellow students of ocular physiology under Professor Hering of Leipsic. Hess studied the mechanism of accommodation, and proved the relaxation of the zonule as predicted by the Helmholtz theory. Bielschowsky studied the ocular movements; but assisted Hess, by demonstrating in his own eyes, downward movement of the lens, during strong accommodation. Professor Bielschowsky came to America and has been kept here by the Rockefeller Foundation to collaborate in the studies of aniseikonia made by Ames, Professor of Physics at Dartmouth.

A course on cataract extraction was given by Dr. John O. McReynolds of Dallas, Texas. The peculiar feature of the McReynolds cataract operation is that the cataract is taken out under a

broad, upward conjunctival bridge. This bridge, held by fixation forceps, gives good control of the eye during the operation. Afterwards it gives a better coaptation of the lips of the corneal incision. It also furnishes a broad vascular supply for the corneal flap. This is an elaboration of the cataract operation worthy of the attention of other operators.

Other lectures, given by local instructors, with demonstrations before sections of the class, and round-table-discussion luncheons, filled out the course. It was arranged so that most of the first week was devoted to ophthalmology, the second week to otolaryngology. The last days were allotted to a meeting of the Western Section of the "Triological" Society, at Santa Barbara.

Wednesday, January 26th, the course being given over to otolaryngology, the Western Ophthalmological Society held its annual meeting. "Disturbances of the vertical motors of the eye" by Professor Bielschowsky opened the program. "A report on seventy-five cases of sympathetic ophthalmitis observed at the Massachusetts Eye and Ear Infirmary" was read by Dr. Rodman Irvine; and one on "Contact glasses," by Dr. John P. Lordan of Los Angeles. In the afternoon there was a symposium upon uveitis, opened by papers on pathological aspects, by Dr. M. M. Beigelman; tubercular etiology, by Dr. H. G. Merrill; and focal infections, by Dr. W. B. Boyce. Probably the Western Society will meet in connection with the Midwinter Course next year.

Edward Jackson

COLOR FIELDS CONDEMNED

The steadily increasing importance of critical study of the visual fields in the problem of cerebral localization has led on the one hand to greater refinement in the study of the white fields and on the other hand to a renewed emphasis on the significance of the color fields. We have also come to attach a larger importance to perimetry and campimetry in regard to lesions of the optic nerve and retina and in dealing with the progress of glaucoma.

It cannot, however, be said that there is universal agreement as to the relative value of various methods of visual-field study. As to the significance of changes in the white field there has been little question; but there have always been some who doubted the dependability of findings as to the color fields. Some still believe that the taking of the color fields is an essential part of perimetric investigation; while others maintain that accurate study of the fields for white will disclose every fact which can possibly be learned from comparison of the color fields.

The mechanism by which visual impressions are received and transmitted to the brain centers is hardly less a mystery today than when it was pondered over by Young or Helmholtz. We know that the retina transforms vibrations into nerve impulses, and there seems no great difficulty in appreciating that stronger stimuli should give rise to sensations of greater brightness. But shall we ever know, rather than theorize, concerning the means by which different wave lengths are interpreted as variety of color?

To most of us it would probably seem natural to suppose that the vibrations which we perceive as color are conveyed impartially by each nerve fiber from the eye to the brain. Furthermore, one might suppose that damage to a single fiber would affect alike its capacity for conveying the individual wave lengths (corresponding to different colors) and for conveying the sum total of those wave lengths (from which we derive the impression of white light).

Some such point of view is inherent in

the criticisms offered by Magitot and Dubois-Poulsen (Annales d'Oculistique, 1937, v. 124, p. 649) under the title "Condemnation of colored test objects."

In favor of the taking of color fields it has been argued that the procedure enlarges scotomata and renders them more manifest; the diameter of the blind spot of Mariotte, for example, being increased one fourth with a red as compared with a white test object. It is believed that defects can be discovered earlier with the colored objects than with a white object.

But this apparent advantage of the color method is unfortunately neutralized by inconveniences, some of which are instrumental, others attributable to the patient.

The constancy of the results obtained depends on the size of the test object, its contrast with the background, its hue, and the intensity of the illumination.

Colored test objects must be relatively large. Using the gray background recommended by Engelking, Ferree, and Rand, and others, red and green are perceived over a much larger field than on a black ground, for the reason that the largest color fields are obtained in the absence of contrast.

It is easy to insure a uniform gray in the perimetric background, but uniformity and permanence are far more difficult in regard to colored papers, discs, or balls, whose tendency to become dull is in proportion to the weakness of their color saturation. They must therefore be changed frequently. The attempt to overcome this difficulty by using a luminous red spot is defeated by the fact that the light intensity of the spot should always be the same, so that it is necessary to resort constantly to new bulbs, adequately standardized, and using an electric current of constant strength.

The two factors in chromatic quality, namely, tint and luminosity, present serious difficulties. Hue varies with intensity of illumination. Most investigators have abandoned colored lights in favor of colored papers. Because the exact character of the illumination changed the zone within which the different colors were perceived, it was proposed to make the tests in full daylight, with the eye preadapted. It was shown by Alajmo that in these conditions the blue and yellow fields coincided and that the red field was 10 degrees larger than the green. There further remain the problems of obtaining papers whose colors would be constantly fresh, and winter days as clear as summer days!

Magitot and Dubois-Poulsen characterize as false the long-cherished belief that the fields for colors are narrower than those for white. "The peripheral achromatopsia of Landolt and Charpentier is an erroneous notion." As a matter of fact, the color fields may extend almost as far as the field for white. Wentworth obtained this result by using spectral colors of sufficient intensity; Feree and Rand, and also Gaudissart, by increasing the illumination. With sufficient illumination, green may be perceived as far at the periphery as white.

The inevitable conclusion is that color perimetry as it is usually practiced and reported can only be possible with colors lacking purity and brilliancy. To every scotoma for color, declare Magitot and Dubois-Poulsen, there is a corresponding scotoma for white.

Certain minor difficulties pertaining to the patient are of definite significance but may be neglected in practice. These include (1) defects of color and light sense (estimated at 4 percent of the cases); (2) the fact that the field for red is smaller in hyperopes and the field for blue diminished in myopes, whereas a narrow pupil enlarges the field in both categories of ametropia; and (3) that age has more

influence in reducing the color fields than the white field.

Of much greater importance is the psychic factor. The taking of a visual field taxes the patient's intelligence and power of attention. Evans has shown that fear may enlarge the blind spot. It is often difficult for a person of moderate intelligence to realize that he must at the same time see the test object and the fixation point, and in color perimetry there is added the further demand for correctly recognizing and naming the colored test objects.

In short, color perimetry calls for more sustained attention than white. Fatigue may produce islands of amblyopia. Many patients have difficulty in maintaining their attention for longer than 10 minutes. The differences in color perimetry are extreme, and it is impossible to obtain complete standardization. The maximum and minimum figures obtained show wide variation.

As contrasted with color perimetry, Magitot and Dubois-Poulsen point out that records of the fields for white have the requisite qualities of simplicity, precision, and constancy of results. This method must, however, be practiced with accurate consideration of all the factors involved. The size of the test object employed should vary according to the zone under examination. Accepting the words in their broad application, the authors quote with approval Moreau's saying that the peripheral field "guesses," the middle field "perceives," and the central field "sees."

As a matter of clinical convenience Magitot and Dubois-Poulsen recognize three principal isopters: (1) peripheral, (2) middle, (3) central. With a gray background and constant illumination, and using the customary 33-centimeter arc, they apply a 3-millimeter test object to the zone outside the 30-degree circle, and a 1-millimeter object to the zone between 10 and 30 degrees. The central zone they suggest should be explored with the stereocampimeter, preferably using Evans' technique for angioscotometry.

W. H. Crisp

PUBLIC-SCHOOL LIGHTING

An interesting and valuable contribution to the science of proper lighting as it pertains to public schools was made by J. Fleischer and A. J. Hoffman in the Transactions of the Illuminating Engineering Society some two years ago. The information gleaned from their investigations should be in the hands of the opthalmological profession to answer the frequent questions. The work was performed in five different public schools in Chicago, involving 78 classrooms and 2,682 students in the fifth, sixth, seventh, and eighth grades. No special conditions were set up beyond the necessary equipment, which consisted of a portable kit so arranged that the lighting intensity on an inclined working plane could be varied from 1 to 400 foot-candles. The color and quality of the light remained constant, the intensity of illumination being the only variable.

In the first trial, undiffused illumination was used, meaning that there was no diffusing medium between the light and the visual task. This was referred to as "undiffused lighting." In the second trial, a screen with good diffusing qualities that eliminated specular reflection was placed between the light and the visual task. The resulting illumination was referred to as "diffused lighting." The child was asked to read good black type on a good quality of white paper, 12-point type being used in the fifth and sixth grades

and 10-point in the seventh and eighth. The child was then asked to increase or decrease the intensity of illumination by a control knob, held in his hand, to the point where the visual task was most comfortable. Photometer readings of the intensity of illumination were made.

In analyzing the results, it was found that the average foot-candles selected with "undiffused lighting" was 47 with a median of 41, while with "diffused lighting," the average foot-candles selected was 26 with a median of 21. All of this means that with diffused, shaded light, 20 foot-candles provided the most comfortable intensity of illumination for the ordinary visual tasks of school life. Verbum sap.

Harry S. Gradle

THERMOPHORE IN RETINAL DETACHMENT

Four cases of detachment of the retina successfully treated by heating with the thermophore are reported in this issue. The technique was essentially evacuation of subretinal fluid through two scleral incisions followed by multiple one-minute applications of the thermophore armed with a contact surface of 3 mm. heated to a temperature of 168°F. Others have used this instrument successfully for the same purpose.

Stripped of modifications necessitated by the individual case—and these may be very important—surgical success, by which is meant reattachment of the retina, is attained by producing an adhesion between the choroid and the detached retina. To effect this an inflammation of the choroid must be induced. Various methods for accomplishing this have been tried, the most popular of which at the moment is diathermy. Multiple pins or punctures with a single needle have been used with about equal frequency. These methods produce only fairly uniform areas of inflammation, even if penetration of the sclera and choroid is practiced; for the exact strength of the current required to pass through the sclera is variable, depending on the wetness of the field, the contact of the ground electrode with the patient, sharpness of the pins, and other factors, so that the exact amount of reaction that will be produced is not predictable in advance. There is, furthermore, a definite danger of retinal damage and hemorrhage from penetrating pins or from too severe a reaction. If pins that do not completely penetrate the sclera are used, the choroidal reaction is even less predictable, because the depth of penetration is uncertain.

The thermophore, on the other hand, can obviously be heated to an exact temperature and maintained at that temperature as long as desired. It requires only an external application and produces a relatively uniform reaction. The disadvantage of the use of this instrument is difficulty of application. This has largely been done away with by employing a sickle-shaped contact surface, which the author of this editorial has designed and recently presented in a paper on the subject, which will be published soon in this Journal. The macular region, however, cannot be reached even with the new applicator. Six cases have been treated with the thermophore in the past two months. Four have been, temporarily at least, surgical successes. The two failures were one in a 2½-year-old case with obvious retinal scarring and extensive disinsertion. A later electrocoagulation operation also failed. The second was a recent case of large detachment with three tears in an aphakic eye.

An important point in applying the thermophore is that the eye must be soft

—hence tapping before application—in order that the posterior half of the eyeball may be reached. Lids must be carefully protected. This is best done with malleable flat retractors about 1 centimeter broad.

The thermophore is useful in just such cases as is electrocoagulation, but is a more exact method of applying heat, and with a suitable contact surface can be very conveniently used. It is a method well worth trying.

Lawrence T. Post.

BOOK NOTICES

ZUR THERAPIE DER EMBOLIE DER ZENTRALARTERIE DER RETINA (Treatment of embolism of the central retinal artery). By Dr. Ernst Johansson, Riga. Paper covers, 86 pages, no illustrations. Published by S. Karger, Berlin, 1937. Price 8.95 Swiss francs.

After discussing the possibility of differentiating between an embolism and a spasm of the central artery, the author discusses the sources of embolism and the recorded cases of spontaneous cure.

Operative treatment includes iridectomy, sclerotomy, paracentesis and puncture, and direct massage of the optic nerve. Cases are cited to illustrate these forms of treatment, and also the effect of bleeding, digitalis, strychnine, pilocarpine, preparations of choline, angioxyl, and padutin, retrobulbar injections of atropine, electrotherapy, injections of corrosive sublimate, and nitrites. Among the various methods employed in 103 cases for which cure or improvement was claimed, massage was effective in 30; operative treatment in 27 (16 of paracentesis or puncture); bleeding, digitalis, angioxyl, atropine, and electricity in 4 each; choline in 7; amyl nitrite in 2; and strychnine and trinitrite in one each. Sixteen cases recovered spontaneously.

W. H. Crisp

SURGICAL ANATOMY OF THE HEAD AND NECK. By John Finch Barnhill, M.D., LL.D. Quarto, 934 pages, 431 illustrations, including many color plates. Baltimore, Wm. Wood and Co., 1937. Price $20.00.

This volume, dedicated to the Research Study Club of Los Angeles, California, is of interest to the ophthalmologist as well as to the otolaryngologist; and to others who are awake to the present movements in graduate medical education. Instead of chapters, it is divided into 35 "Periods." Of especial interest to the ophthalmologist are periods ix to xx inclusive. These deal with the sella turcica and environment, Gasserian ganglion, facial and viii nerve, sphenoidal sinus, ethmoidal cells, frontal sinus, the meninges, brain, structures of the orbit, and orbital contents. The interest of ophthalmic medicine, of course, extends to many of the other "periods." Illustrations in other parts of the book will help the ophthalmologist to recall his knowledge of the anatomy of the orbit and neighboring parts. Most of the illustrations are massed, with their legends, in the last 450 pages, where they serve, coöperatively, for ready reference.

This book represents an enormous amount of work on the part of Dr. Barnhill and those who have assisted in its preparation. The introduction is written by Dr. Paul S. McKibben, Professor of Anatomy in the University of Southern California, School of Medicine. As the accumulation of scientific facts goes on increasing with ever greater rapidity, books like this, which assemble, illustrate, arrange, classify, and index the important facts, become more and more essential to the expanding practice of medicine.

Edward Jackson.

TEXTBOOK OF OPHTHALMOLOGY. By S. R. Gifford. Clothbound, 492 pages, 245 illustrations. Philadelphia, W. B. Saunders Co. Price $4.00.

It is scarcely feasible for a reviewer to read every word of a 500-page textbook, and time has not permitted such a study of this new one, but it has nevertheless been subjected to a very careful scrutiny, for there is probably nothing in ophthalmic literature that exerts so wide an influence from the teacher's viewpoint as a textbook. This one is obviously designed for medical students, although it is sufficiently comprehensive, and, above all, up to date, to be of real value to the practicing ophthalmologist. Every medical practitioner should have a good textbook in each specialty, and this is exactly the type for such a purpose. It may not compete with the original Fuchs textbook or with those of Duke-Elder or Berens for the practicing ophthalmologist or the interne in ophthalmology, but the amount and exactness of the information that it contains are surprising.

The sequence of presenting the subject does not vary from the usual; paper, print, binding are the best, but everything else strikes the reader as a bit unusual. There is a freshness about the style and point of view that suggests that the author has discarded tradition and written of his subject as it appeals to him. One gets the impression of almost everything that it is a matter on which he has his own opinion. The illustrations, too, create this impression. Many fundus photographs have been introduced. They are not all as clear as could be hoped, but they do show actual conditions which fill in nicely with the excellent diagrams and unusually good colored reproductions. Though many of these illustrations are from original sources there is a generous selection of the best examples borrowed from other texts.

It seems unnecessary to enter into details. The book is excellent, contains sound ideas, is modern, clear, and readable. It deserves a warm reception from ophthalmologists. Congratulations to the author on adding such a good companion to his "Ocular therapeutics."

Lawrence T. Post

OBITUARY

GEORGE L. STRADER
1870-1938

George Leslie Strader, of Cheyenne, Wyoming, died January 21, 1938, at the age of 67 years. He was born in Illinois and graduated from the McComb Illinois Normal School. He taught school for a time, studied medicine for a year in Chicago, and completed his medical course in the Omaha Medical College, taking his degree of M.D., in 1899. For five years he worked in the office of Harold Gifford, in Omaha; then removed to Cheyenne, Wyoming, where he engaged in the practice of ophthalmology and otolaryngology. Dr. Strader became the leading ophthalmologist of his state, was president of the Wyoming State Medical Society, and served on the staff of St. John's Hospital and the Pershing Hospital. He also served as a member of the State Legislature, of the State Board of Health, and of the Cheyenne School Board. He was an active member of the Colorado Ophthalmological Society, and of the American Academy of Ophthalmology and Otolaryngology, and a Fellow of the American College of Surgeons. He wrote little, but took an active interest in practical, clinical work. Dr. Strader retired from practice last year on account of failing health. His death at Claremont, California, followed a cerebral hemorrhage.

Edward Jackson

CORRESPONDENCE

Confusion in the usage of the words Hemeralopia and Nyctalopia

March 8, 1938

There is an annoying confusion in the usage of these two words. Different authors use either word in two contrasting meanings, which is, of course, absurd. Hemeralopia cannot mean night-blindness and day-blindness. It must confuse the reader. Science demands precise definitions.

Some authors derive the word "hemeralopia" from two Greek words: hemera-day, opia-vision. Others from three words: hemera-day, alaos-blind, opia-vision.

The first definition is day-vision and implies *night-blindness.* The second definition is day-blind-vision and means *day-blindness.* The ambiguous etymology is perhaps the root of the confusion.

However it may be, the etymology of the word hemeralopia leads us nowhere. If one accepts the two-word construction, the word should read hemeropia, as Guthrie insists, because by combining "opia" with another word the ending of the preceding word is usually omitted, for instance: emmetr(os) + opia result in emmetropia. If one accepts the three-word construction, the word should read hemeralaopia instead of hemeralopia (hemer(a) + ala(os) + opia).

I believe that the three-word construction is erroneous because in no other compound word, as far as I can see, is "opia" joined to the first part with a preceding intermediate word; for instance, ambly-opia, my-opia, presby-opia, and so on. Besides, day-blind vision (opia means vision, ops means eye) is somehow a strange way of expressing a meaning which could be expressed more simply by the use of two words—night-vision.

In Webster's New International Dictionary where the three-word etymology is accepted there is a confusion on this subject. Nyctalopia is termed *night-blindness,* and on the same page, below, nyctalope is reported, as having the *power of seeing by night.*

In the American Encyclopedia of Ophthalmology (v. 11, pp. 8394-8396) in the chapter on Nyctalopia, which is termed night-blindness, are presented Dr. Löhlein's observations under the name hemeralopia.

Such authorities as Ernst Fuchs and de Schweinitz, use the same word with contrasting meanings.

The etymology of the words hemeralopia and nyctalopia is of little practical importance. What should count is the fact that *hemeralopia* was used by the oldest writers for *night-blindness,* and the confusion was introduced later. For this reason I think that hemeralopia should remain as meaning night-blindness.

At any rate, this subject should be thrashed out at the International Ophthalmological Congress, and a uniform usage should be accepted.

(Signed) O. R. Lourie

Dosage of x ray in corneal infiltration

April 9, 1938

I notice that our Colorado Society report for March 20, 1937, carries an inaccuracy that may mislead someone. On page 301 of the March issue toward the bottom of the left-hand column, I am quoted as recommending an erythema dose of X ray in a case of corneal infiltration. I have never recommended more than one third of an erythema dose for such a purpose.

(Signed) W. H. Crisp

ABSTRACT DEPARTMENT

EDITED BY DR. WILLIAM H. CRISP

Abstracts are classified under the divisions listed below, which broadly correspond to those formerly used in the Ophthalmic Year Book. It must be remembered that any given paper may belong to several divisions of ophthalmology, although here it is only mentioned in one. Not all of the headings will necessarily be found in any one issue of the Journal.

CLASSIFICATION

1. General methods of diagnosis
2. Therapeutics and operations
3. Physiologic optics, refraction, and color vision
4. Ocular movements
5. Conjunctiva
6. Cornea and sclera
7. Uveal tract, sympathetic disease, and aqueous humor
8. Glaucoma and ocular tension
9. Crystalline lens
10. Retina and vitreous
11. Optic nerve and toxic amblyopias
12. Visual tracts and centers
13. Eyeball and orbit
14. Eyelids and lacrimal apparatus
15. Tumors
16. Injuries
17. Systemic diseases and parasites
18. Hygiene, sociology, education, and history
19. Anatomy, embryology, and comparative ophthalmology

4

OCULAR MOVEMENTS

Strebel, J. **Supplementary remarks on the author's paper, "Improvement of Prince's method for advancement."** Klin. M. f. Augenh., 1938, vol. 100, Jan., p. 93.

The author seeks to clarify the description of his modification of the Prince operation. (See Amer. Jour. Ophth., 1937, v. 20, p. 1276.)

Wegner, W. **The surgical treatment of destruction of the trochlea.** Klin. M. f. Augenh., 1938, v. 100, Jan., p. 20. (See Section 16, Injuries.)

Woolard, H. H. **The innervation of the ocular muscles and the mesencephalic root of the fifth nerve.** Trans. Ophth. Soc. United Kingdom, 1937, v. 57, p. 84.

The author reports that experience and experiment affirm sensitive control of the ocular muscles by proprioceptive reflexes. Histologic examinations have revealed the usual forms of the motor terminal plates and sympathetic fibers ramifying on blood vessels, and also endings which assume the form of tendrils with expanded extremities which clasp the muscle fiber around the sarcolemma. The ends come from a thin and only finely medullated nerve fiber, which divides into several endings and ramifies widely to several muscle fibers.

These nerve fibers are not connected with the fifth nerve nor with the sympathetic system but issue from the brain stem by being incorporated in the oculomotor nerve. Beulah Cushman.

5

CONJUNCTIVA

Banerjee, N. C. **Radium therapy in spring catarrh.** Proc. All-India Ophth. Soc., 1936, v. 5, pp. 244-246.

The technique for application of the radium treatment of vernal conjunctivitis as described by Stallard is given. The treatment is repeated at intervals of from one to three months. A safe dose is 300 mg. minutes for each eye. Children and recent cases give the best results, whereas those with degenerative changes should not be treated with radium. Lawrence G. Dunlap.

Bengisu, Naci. **A case of meningococcic meningitis.** Ann. d'Ocul., 1937, v. 174, Nov., pp. 756-757.

A man aged twenty years was observed with a severe purulent conjunctivitis of the right eye. A diagnosis of gonorrheal conjunctivitis was based on the appearance, and on the discovery of gram-negative intracellular and extracellular diplococci in smears. Two days after onset of the conjunctivitis the patient developed fever and delirium. Meningococci were found in the spinal fluid. The patient died a week later of epidemic meningitis.

John C. Long.

Castelli, Adolfo. **Zinc peroxide. Considerations and results after its use in the therapy of trachoma.** Boll. d'Ocul., 1937, v. 16, Oct., pp. 1051-1063.

This product is marketed in the form of fine white powder—insoluble in water—containing 50 percent of pure peroxide. It is useful in treatment of trachomatous pannus and asthenic ulcers. The author describes its uses, its effects, and the mechanism of its action.

M. Lombardo.

Cecchetto, E. **The Credé method.** Rassegna Ital. d'Ottal., 1937, v. 6, Sept.-Oct., p. 602.

Cecchetto considers instillation of one-percent silver-nitrate solution not only ineffective but dangerous to the corneal epithelium. He prefers to wipe off the lid margins with sterile salt solution or boiled water, and, if infection occurs, to treat the conjunctivitis by lavage with oxycyanide of mercury, in addition to atropine and an ointment of antipiol. Antigonococcic vaccine is also used. The author claims better results than by instillation of silver nitrate.

Eugene M. Blake.

Dimitry, T. J. **Iodized-oil technique in pterygium cases.** New York State Jour. Med., 1937, v. 37, April 15, p. 719.

Pterygiums were distended by injections of iodized oil. Successes from the transplantation operation are said to be due to undermining and breaking up of the tissue and not to the change in course. Dimitry advises removal of the head of the pterygium regardless of the general procedure adopted. In this method, after the oil is injected the head is first divided about 3 mm. from the corneo-scleral margin and then pulled or stripped from the cornea. There is no corneal irritation from the oil. (Plates) F. M. Crage.

Granström, K. O. **A contribution to the knowledge of the importance of herpes infections in corneal and conjunctival affections, especially in membranous conjunctivitis.** Acta Ophth., 1937, v. 15, pt. 4, p. 361. (See Section 6, Cornea and sclera.)

Julianelle, L. A. **Relation of inclusion blennorrhea to swimming-bath conjunctivitis as determined by an accidental transmission.** Proc. Soc. for Exper. Biol. and Med., 1937, v. 36, June, pp. 617-619.

After delineation of a case report the author states that the conclusion seems warranted that inclusion blennorrhea and swimming-bath conjunctivitis are essentially the same disease, the former representing the conjunctival response of the infant, the latter the conjunctival response of the adult to the same etiologic agent. Ralph W. Danielson.

Lyons, F. M. **Observations on the pathogenesis of spring catarrh.** Giza Mem. Ophth. Lab., 1936, 11th rept., pp. 121-144.

Calcium deficiency may increase the sensitivity of the patient. The average age of onset of spring catarrh in one hundred patients was about 14 years,

and it was 3.3 times more frequently observed in males than in females. The disease begins during the hot weather and subsides during the cold weather, although about twenty percent of the patients retain the disease in a less active form during the winter months. After six or seven years spontaneous cure usually results. Itching is a constant feature of the disease, and at the same time there is a formation of sticky membranous discharge containing eosinophiles. The discharge is principally from the tarsal conjunctiva of the upper lid, and is more copious during the periods of greatest itching. For treatment the author recommends administration of vitamin D and calcium with a quart of milk daily for about two weeks, cold or iced application to the lids, and instillation of strong solutions of adrenalin or levoglaucosan. While vasoconstriction lasts no membrane is formed and the patient is free from symptoms. Lawrence G. Dunlap.

Nobile, Maria. **A case of papulo-erosive syphilitic manifestation of the palpebral conjunctiva.** Boll. d'Ocul., 1937, v. 16, Oct., pp. 1064-1075.

A woman of 31 years, who four months previously had been infected with lues, showed typical specific skin and glandular lesions, together with lacrimation, photophobia, redness, and edema of the lids. There was also a deformation of the margins of both lower lids. On everting the right lower lid an ovoid papular elevation of the conjunctiva was seen, reaching the margin near the internal canthus. Two similar formations were present in the outer half of the left lower lid. At the temporal side of the right bulbar conjunctiva was a reddish-gray mass of large confluent granules. The writer is of the opinion that the papular and granular luetic formations of the conjunctiva are to be considered identical lesions, the papular representing an advanced stage. (Bibliography, 2 colored figures.) M. Lombardo.

Rambo, V. C. **The surgical treatment of trachoma.** Amer. Jour. Ophth., 1938, v. 21, March, pp. 277-285.

Rosenzweig, M. G. **Transplantation of conjunctiva from a cadaver.** Viestnik Opht., 1937, v. 11, pt. 3, p. 311.

A laboratory study on rabbits, consisting of three experiments: transplantation of the conjunctiva from a live rabbit; from a rabbit dead for two hours; and of conjunctiva preserved for nine days in the rabbit's own blood. All three transplants took.

Ray K. Daily.

Stewart, F. H. **Note on free initial bodies and free elementary granules in trachoma of Egypt, Madras, and Hong Kong.** Giza Mem. Ophth. Lab., 1936, 11th rept., pp. 145-147.

Free initial bodies were found in seven out of 37 cases of trachoma, and only in very small numbers, not more than three or four on a slide.

Lawrence G. Dunlap.

Wilson, R. P. **Trachoma and inclusion bodies.** Giza Mem. Ophth. Lab., 1936, 11th rept., pp. 113-118.

Because the Prowazek-Halberstaedter bodies were found so inconsistently in Egyptian trachoma, their presence was thought to be of little significance, but this opinion has changed with better methods of examination. Trachoma is usually acquired by Egyptians during the first year of life, frequently within the first six months, and advanced stages are commonly seen in children of four or five years. Inclusion bodies are to be found in 100 percent of

the cases at the onset of trachoma. They may be found before trachoma is definitely distinguishable clinically. The form most frequently encountered was the initial body, visible as intra-epithelial cocco-bacillary granules of various size and shape, often clumped together in little groups and staining blue with Giemsa. Lawrence G. Dunlap.

Wilson, R. P. **Treatment of acute ophthalmias with pyrifer administered intramuscularly.** Giza Mem. Ophth. Lab., 1936, 11th rept., pp. 118-119.

The active constituents of pyrifer are fever-producing bacteriologic substances, obtained from nonpathogenic strains. Intramuscular injections were entirely unsatisfactory, and the preparation must be given intravenously. Lawrence G. Dunlap.

Wilson, R. P., and Lyons, F. M. **Pemphigoid affection of both eyes causing destruction of the epithelium, symblepharon, and blindness.** Giza Mem. Ophth. Lab., 1936, 11th rept., pp. 81-82.

A male aged 45 years, with a history of syphilis twenty years earlier, a severe skin eruption of face and arms two years earlier, and a fever of unknown origin for forty days one year earlier, had total symblepharon with a superficial membrane covering, or replacing, the entire epithelium of the left conjunctiva and cornea. The right eye showed a symblepharon joining the outer fourth of the lower lid to the adjacent globe, and an invasion of the corneal epithelium around the entire limbus. Lawrence G. Dunlap.

Wilson, R. P., and Stewart, F. H. **Variations in the seasonal incidence of the acute ophthalmias in different parts of Egypt.** Giza Mem. Ophth. Lab., 1936, 11th rept., pp. 95-112.

In Egypt, Koch-Weeks conjunctivitis does not assume epidemic proportions until the mean maximum temperature reaches approximately 25 or 26°C. Gonococcal conjunctivitis does not become epidemic until the mean maximum temperature reaches approximately 32-35°C. There are usually two principal fly-breeding seasons in the year, in spring and autumn. The first occurs when the mean maximum temperature reaches 22 to 24°C. At about 35°C. fly breeding is checked, so that during the hottest months of the year especially above 35°C.) the incidence of flies is reduced. Koch-Weeks conjunctivitis becomes epidemic soon after the flies begin to increase, and the maximum incidence of Koch-Weeks conjunctivitis coincides with the height of the first fly-breeding season. Gonococcal conjunctivitis does not increase, even during the first fly-breeding season, until the temperature reaches approximately 32°C. Maximum incidence of gonococcal conjunctivitis and the height of the autumnal Koch-Weeks conjunctivitis coincide with the second fly-breeding season. The summer minimum of Koch-Weeks conjunctivitis and the August fall in gonococcal conjunctivitis coincide with the summer minimum of flies.

Authors conclude that heat and flies are the two most vital factors in the causation of epidemic conjunctivitis in Egypt. Lawrence G. Dunlap.

6

CORNEA AND SCLERA

Ascher, K. **Krukenberg pigment spindle.** Klin. M. f. Augenh., 1937, v. 99, Dec., p. 813.

In a patient observed from her 84th to her 96th year, the author noted well developed, possibly increasing post-

corneal pigment deposits in the form of a Krukenberg spindle. In other respects the eyes were normal and increased tension was never noted.

F. Herbert Haessler.

Barua, R. R. **Tattooing of cornea.** Proc. All-India Ophth. Soc., 1936, v. 5, pp. 59-63.

The author applies 2-percent solution of gold chloride to the denuded corneal leucoma for one minute; then 2-percent hydrazin hydrate for a half minute. Two-percent platinum chloride may be substituted for the gold chloride. One-percent solution of tannin used instead of hydrazin hydrate as a reducing agent causes a light brown instead of a black tattoo.

Lawrence G. Dunlap.

Bossalino, Giuseppe. **Familial degeneration of the cornea.** Rassegna Ital. d'Ottal., 1937, v. 6, Sept.-Oct., p. 542.

Four cases of familial degeneration of the cornea are described, affecting patients between 24 and 36 years of age. Three generations on the paternal side had been affected by corneal disease. The opacities in all four cases were rounded, nodular, and subepithelial, and involved the central portion of the cornea. One case showed in addition to the above changes deeper striæ and undulations in the corneal stroma. The author gives a good review of our knowledge of the various familial corneal degenerations. (One figure)

Eugene M. Blake.

Filatov, V. P. **Therapeutic corneal transplantation in the treatment of keratitis and tissue transplantation in diseases of the skin.** Viestnik Opht., 1937, v. 11, pt. 3, p. 295.

Detailed reports of therapeutic partial corneal transplantations in cases of tuberculous keratitis, herpetic keratitis, trachomatous pannus, sclerosing keratitis, and parenchymatous keratitis; and also of therapeutic skin transplantation in two cases of lupus of the face. In all cases the procedure was followed by regression of the pathologic process. In inflammatory processes the inflammation subsided. In loss of elasticity this property was regained. Ulcers healed; transparency was restored. Filatov believes that the functional and defensive properties of the tissue cells are activated by substances designated as autocatalyzers, and that implantation of homologous tissue stimulates formation of these catalyzers. (Illustrations.)

Ray K. Daily.

Granström, K. O. **A contribution to the knowledge of the importance of herpes infections in corneal and conjunctival affections, especially in membranous conjunctivitis.** Acta Ophth., 1937, v. 15, pt. 4, p. 361.

In six cases the diagnosis was confirmed by transmission into a rabbit's cornea—a procedure which the author urges for diagnostic purposes. Several of his cases had features of Parinaud's conjunctivitis, with negative bacteriologic findings, and the author urges that a herpetic infection be suspected in all cases of severe unilateral conjunctivitis of obscure etiology.

Ray K. Daily.

Gurvich, B. A. **Therapy of trachomatous pannus.** Viestnik Opht., 1938, v. 11, pt. 3, p. 317.

Brief reports of 32 cases treated with two-percent copper-sulphate solution. The author concludes that the method gives a rapid and satisfactory effect. Photophobia and lacrimation disappear, pain subsides, infiltrates absorb, vascularization diminishes, and vision im-

proves. This treatment proved effective where other procedures had failed. It has the advantage of not requiring hospitalization and a skilled personnel.

Ray K. Daily.

Kaul, S. N. **Interstitial keratitis in the Punjab.** Proc. All-India Ophth. Soc., 1936, v. 5, pp. 35-44.

In over 20,000 new eye cases seen during a period of three years, 26 cases of interstitial keratitis were recorded, about one half being due to inherited, and one half to acquired syphilis. Cases seen in the first month required about two months treatment for all the acute symptoms to disappear. Cases first seen later required longer. Mild corneal trauma is said to have precipitated the attack in at least 10 percent of the cases. Cataract extractions may serve as the traumatic factor with the interstitial keratitis developing two to four weeks after extraction. Antiluetic arsenical injections have given the author rapid and satisfactory results along with the use of atropine locally. He also thinks bismuth and potassium iodide excellent for supplementary treatment. Lawrence G. Dunlap.

Kirwan, E. O'G. **Corneal grafting.** Proc. All-India Ophth. Soc., 1936, v. 5, pp. 50-53.

The author reports three successful cases. Patient 1 was 55 years old and totally blind in both eyes; the right eye from optic atrophy and hypotony following a couching operation for cataract three years previously; the left eye from a dense leucoma due to an inflammatory attack four years previously. The vision was light perception and light projection. After enucleation of the right eye, a 4-mm. disc of its clear cornea was transplanted on to the cornea of the left eye. The vision obtained was 2/60. There was old iridocyclitis and vitreous degeneration but the result allowed the patient to find his way about unaided.

In case 2 the graft was taken from an eyeball which had to be removed for old chronic glaucoma in an 80-year-old patient of different blood group and sex. The recipient was a woman aged 21 years who, after eighteen months of interstitial keratitis and antiluetic treatment, had a completely opaque right cornea. The vision of the left eye was 6/6. Eleven weeks after operation the vision through the graft was 6/36. A year later the left eye developed interstitial keratitis followed by dense opacity of the cornea, and the vision was reduced to light perception, but the vision in the eye which had undergone keratoplasty remained 6/36. A contact glass corrected the vision to 6/12 partly.

Patient 3 was a Hindu male aged 23 years, with vision reduced to hand movement at one foot in both eyes by dense corneal opacities from interstitial keratitis. He received a corneal graft from a Hindu male aged 58 years, suffering from old iridocyclitis with secondary glaucoma. After the graft, the vision was 6/36 and the periphery of the cornea cleared remarkably. The other eye had a keratoplasty done, but, though the graft took well, it became highly vascular and gradually opaque. However, apparently from the stimulating effect of the graft, the periphery of the cornea cleared to an astonishing degree, so that optical iridectomy up and out produced vision of 5/60.

Lawrence G. Dunlap.

Mekhri, M. S. **Acute keratoconus—report of two cases.** Proc. All-India Ophth. Soc., 1936, v. 5, pp. 45-49.

Both cases of conical cornea occurred within three days, with an acute in-

flammatory condition as the immediate cause. A student aged twenty years came with poor vision of the left eye, a white patch covering most of the left cornea, and a history of having had no eye trouble on the previous day. The conical cornea had a fairly sharp apex covered with a dense leucoma. Vision was 1/60. The central part of the cornea was five or six times thicker than the peripheral cornea, the substantia propria was greatly thickened and opaque. The other eye was normal. Under iodides and calcium, the cone flattened appreciably in three weeks. Eighteen months later, the conical cornea was still present but not so prominent. The second case was in a girl aged ten years, who had "sore eyes," and two nights later a noticeable right conical cornea and a diffuse central opacity covering two thirds of the cornea. The apex of the cone was ulcerated. Six months later, the cornea was still conical but less than half as much as when first seen. Fleischer's ring was present in each case at later examinations. Lawrence G. Dunlap.

Melik-Musian, B. H. **Comments on Krachmalnikov's article on "Operations for trachomatous pannus."** Viestnik Opht., 1937, v. 11, pt. 3, p. 395.

A criticism of excessive claims of Krachmalnikov for his operation. (See Amer. Jour. Ophth., 1937, v. 21, p. 323.)

Ray K. Daily.

Mukerjee, S. K. **Corneal grafting.** Proc. All-India Ophth. Soc., 1936, v. 5, pp. 54-58.

The author applies double cross stitches over the cornea, trephines through the opacity, leaving the corneal disc attached by a hinge as in the Elliot operation while an assistant cuts a similar disc from a donor's cornea. The stitches are then tightened over the graft. The patient is kept at absolute rest in bed, dressed on the third day, stitches removed on the sixth day, and the bandage removed on the eighth day. In all five cases the grafts took nicely, but in two cases the grafted cornea became opaque. Two cases obtained a vision of 6/60.

Lawrence G. Dunlap.

Tizzard, T. H. S. **Corneal grafting.** Lancet, 1937, v. 1, May 8, pp. 1106-1107.

The author states that grafting in a case of interstitial keratitis should never be performed until the eye has been quiet for at least twelve months. Operation is contraindicated if cultures from either the donor or recipient are positive after 48 hours incubation. Tension should be within normal limits and projection of light should be accurate. The patient mentioned in this report was operated upon in 1936. Three weeks after the operation the patient was able to count fingers at two feet. At the present time vision remains the same. The corneal transplant was held in place by a conjunctival flap fastened by a purse-string suture. In this case there is also a cataract and the author proposes soon to extract it. (One photograph. 8 references.)

Ralph W. Danielson.

Wilson, R. P., and Lyons, F. M. **Epithelial dystrophy of the cornea in a case of spring catarrh.** Giza Mem. Ophth. Lab., 1936, 11th rept., pp. 82-84.

A female aged 17 years had trachoma III plus spring catarrh. When semiweekly painting with chaulmoogra oil effected no improvement, a course of radium was given. An accidental abrasion of the cornea healed, but a month later over the site of the abrasion there was typical epithelial dystrophy with

no changes in the substantia propria or in Descemet's membrane. In the left, untraumatized eye was a similar condition. No etiology was found and no treatment had any effect on the progress of the dystrophy.

Lawrence G. Dunlap.

7

UVEAL TRACT, SYMPATHETIC DISEASE, AND AQUEOUS HUMOR

Jayle, G. E., and Derrien, Y. I. **Contribution to comparative study of the composition of aqueous humor and blood plasma in man and dog.** Part 1. Role of the "vascular permeability" factor in the distribution of sodium chloride and glucose. Arch. d'Opht.-Rev. Gén. d'Opht., 1937, v. 1, Dec., p. 1083.

The authors studied the electrolytic and nonelectrolytic distribution of sodium chloride and glucose between the blood plasma on the one hand and primary aqueous humor, or the secondary aqueous formation, removed from nine to twenty minutes after the first puncture, on the other hand. The micro method of Ruszniak and of Hagedorn-Jensen was used. The authors conclude that the ratio of aqueous-humor glucose to plasma glucose is always less than or at most equal to one. The proportion of aqueous sodium-chloride to plasma sodium-chloride is always greater than or at least equal to one. In the majority of the cases studied the variations of the chloride and the glucose proportions are inversely related, so that if one is elevated the other is correspondingly lowered. Vascular permeability appears to be one of the predominant factors of the biologic equilibrium between aqueous and plasma. Derrick Vail.

King, E. F. **The pathogenesis of the melanomata.** Trans. Ophth. Soc. United Kingdom, 1937, v. 57, p. 97.

The different theories as to the origin of uveal melanoma in relation to the skin are given and the neurogenic origin as suggested by Masson is given in detail. Masson regards melanomata as tumor formations of the special end apparatus of the cutaneous nerve among the epithelial cells and in the derma beneath them. He considers pigmentation an expression of changed metabolic activity and in no way essential.

Beulah Cushman.

Narayana Rao, B. K., and Mehkri, M. S. **Injuries of the eye and incidence of sympathetic ophthalmia in South India.** Proc. All-India Ophth. Soc., 1936, v. 5, pp. 223-234.

During four years, the authors treated 479 patients with trauma to the eyeball, severe enough to necessitate hospitalization. Twenty-eight cases of sympathetic ophthalmia were observed. Ruptures of the eyeball, especially those involving the region of the ciliary body and the root of the iris, form the most potent source of danger of sympathetic ophthalmia. Thirteen followed penetrating wounds, six, cataract operations, and six, other intraocular operations, including two cases of couching operation. There was one case of subconjunctival rupture with a non-perforating corneal ulcer, and one case was due to irritative medication. The time that elapsed between injury to the one eye and development of sympathetic disease in the other eye varied from three weeks to fifteen years, and the authors consider the greatest risk of sympathetic ophthalmia to exist between four weeks and four months after the injury. Enucleation of the exciting eye even before signs of sympathetic disease occur is not an absolute guarantee nor a reliable preventive against development of the disease at a

later period. Most of the cases here reported occurred two to four weeks after enucleation of the injured eye, and in one case the disease commenced eight weeks after enucleation.

Lawrence G. Dunlap.

Neher, E. M. **Aniridia congenita, irideremia.** Amer. Jour. Ophth., 1938, v. 21, March, pp. 293-298; also Trans. Western Ophth. Soc., 1937, 4th mtg.

Pantasatos, G. **Necrosis in sympathizing infiltrates and periphlebitis retinalis sympathicus.** Zeit. f. Augenh., 1937, v. 93, Dec., p. 293.

The author describes histologic preparations from an eye in which sympathetic ophthalmia occurred four weeks after an uncomplicated cataract extraction. Areas of uveal necrosis and periphlebitis retinalis sympatheticus were found. These two findings are no longer surprising, since Meller has shown that no histologic difference between sympathetic ophthalmia and tuberculous uveitis are demonstrable and has offered evidence that the former is a post-traumatic spontaneous tuberculous uveitis. F. Herbert Haessler.

Poliakova-Spector, M. I. **Bilateral and symmetrical primary atrophy of the anterior layer of the iris.** Viestnik Opht., 1937, v. 11, pt. 3, p. 371.

A report of a case of congenital, symmetrical, bilateral aplasia of the anterior layer of the iris. The author believes that the anomaly develops through continuation of absorption of the pupillary membrane. Normally, absorption of the pupillary membrane ceases as soon as the pupil is formed. Failure of arrest in this process, she believes, may lead to absorption of the anterior layers of the iris.

Ray K. Daily.

8

GLAUCOMA AND OCULAR TENSION

Acharya, B. G. S. **Etiology of glaucoma.** Proc. All-India Ophth. Soc., 1936, v. 5, pp. 123-125.

The author considers primary glaucoma to be a disease due to accumulation of products of metabolism, i.e., auto-intoxication. He found the average basal metabolic rate in glaucomatous patients 50 percent more than normal, blood urea increased, pulse rate always increased, and erythrocyte sedimentation slightly higher than normal.

Lawrence G. Dunlap.

Banaji, B. P. **Iridencleisis operation for glaucoma with diathermic cauterization of the prolapsed iris.** Proc. All-India Ophth. Soc., 1936, v. 5, pp. 160-163.

The author incarcerates a big knuckle of iris in the corneoscleral wound under a big conjunctival flap to produce adhesion of the iris to the overlying conjunctiva. In his hands a blunt diathermic electrode on a cautery switch produces the best adhesions. He has seen no complications at the time of operation, no case of hypotony, only one case of late infection (which occurred three years after the operation), and two cases of sympathetic ophthalmia. In his last 270 cases there was no late infection or sympathetic ophthalmia. Lawrence G. Dunlap.

Bhaduri, B. N., and Biswas, C. K. **Influence of dark adaptation on the variation of intraocular tension in epidemic dropsy.** Proc. All-India Ophth. Soc., 1936, v. 5, pp. 147-150.

The author finds a 6-mm. rise in tension during dark adaptation to be a sign of primary glaucoma. Sixty cases of epidemic-dropsy glaucoma were studied and 25 normals. Lawrence G. Dunlap.

Chepkalova, V. M. **The operation of choice in absolute painful glaucoma.** Viestnik Opht., 1937, v. 11, pt. 3, p. 361.

The operation of choice in the Moscow Ophthalmologic Institute is opticociliary neurectomy, which relieves the pain. Among postoperative complications are degenerative corneal changes and strabismus. In 154 cases there were nine with degenerative changes and eighteen with strabismus. The author emphasizes the importance of eliminating the possibility of an intraocular tumor before applying this procedure. Ray K. Daily.

Dutt, S. C. **Bengal glaucoma.** Proc. All-India Ophth. Soc., 1936, v. 5, pp. 126-135.

The glaucoma of epidemic dropsy is confined practically to Bengal. The tension is frequently as high as 100 mm. (Schiötz), without causing pain or congestion. Three percent of all persons suffering from epidemic dropsy show signs of glaucoma. One eye hospital in Calcutta records 1,000 glaucoma operations annually. Ninety percent of the cases occurred amongst the middle class and comparatively rich. The most frequent age incidence is 18 to 35 years. A toxin is accepted as the cause but its source is unknown, although strict exclusion of rice from the dietary of patients often relieved the symptoms in the early cases. Corneoscleral trephining is the only operative procedure recommended. Lawrence G. Dunlap.

Harbhajan Singh. **Observations on the relative value of various operations in chronic glaucoma.** Proc. All-India Ophth. Soc., 1936, v. 5, pp. 151-159.

Iridectomy is done to reëstablish normal intraocular drainage for acute inflammatory glaucoma, while Elliot's corneo-scleral trephining is done to establish artificial drainage between the anterior chamber and subconjunctival tissue for chronic simple glaucoma. Sixty-five percent of cases of chronic simple glaucoma ultimately go blind with iridectomy only, and this operation hastens cataract development. Iridectomy is the operation of choice in chronic secondary glaucoma. 1,600 trephine operations were done in eight years and Singh advises a complete iridectomy with the trephine operation in advanced and neglected cases and where cataract is anticipated. Complications after trephining were: intraocular hemorrhage, 1 percent; loss of vitreous 0.5 percent; partial plugging of the trephine hole by uveal tissue, seen at first dressing, 1 percent; hypotonus with hazy cornea, clearing up within a week or ten days, 2.5 percent; shrinking down of the flap, 1 percent; and signs of iritis as evidenced by refusal of the pupil to dilate fully, 14 percent. In patients with little field loss and good preoperative vision, 18 percent of the trephine holes closed and there was absence of filtration bleb, but only 6 percent had a return of symptoms. In established glaucoma with field and visual losses, 24 percent of the trephine holes closed but tension rose in only 19 percent. The author is now resorting to iridencleisis in advanced cases of glaucoma, because of the simplicity of the operation and the lower incidence of complications.

Lawrence G. Dunlap.

Kukán, Franz. **Closing the chamber angle by means of negative pressure.** Klin. M. f. Augenh., 1938, v. 100, Jan., p. 68.

The application of pressure to the eyeball is followed by reduction of tension which is ascribed to one of two factors; namely, expression of aqueous through Schlemm's canal and the expression of blood from the choroid.

The author produced pressure in the eyeball by applying a small bell and measurable negative pressure by suction. When the bell was chosen of such a size that its edge was exactly applied to the limbus, Schlemm's canal was presumably closed when suction was applied, and no reduction of tension followed. When a larger bell was used, Schlemm's canal was not blocked. In this case, an equal negative pressure applied to the same patient's other eye produced a great reduction in intraocular tension. From such findings in fifteen patients, the author concludes that the reduction in tension must be ascribed to loss of aqueous and that only the chamber angle is important in this loss. F. Herbert Haessler.

Mekhri, M. S., and Krishnamurthy, K. **Some observations in primary glaucoma cases.** Proc. All-India Ophth. Soc., 1936, v. 5, pp. 136-141.

In four years 322 uncomplicated cases of primary glaucoma were observed. Contrary to European and American figures glaucoma is not at all rare between ten and twenty years of age, but the incidence increases as age advances. Eight percent of the cases occurred in the age group of ten to thirty years, and thirteen out of eighteen cases in this young group were females. The authors find glaucoma in the young to be associated with endocrine hypofunction, perhaps due to prolonged vitamin deficiency in persons with a glaucomatous diathesis.
Lawrence G. Dunlap.

Nicolato, A. **Alterations of the optic nerve in primary glaucoma.** Rassegna Ital. d'Ottal., 1937, v. 6, Sept.-Oct., p. 507.

The author was able to study the optic nerve microscopically in an early case of primary glaucoma. He gave especial consideration to the preliminary portion. Some sections showed a moderate central funnel-shaped excavation which was craterlike in others. The lamina was in place and was little altered. Some of the nerve fibers were decolorized and granular. It was evident that the products of disintegration of the various constituent elements were rapidly absorbed. A similar disintegration of elements has been demonstrated in the trabeculae of Fontana's spaces in early glaucoma. The retina showed connective tissues in the nerve fiber layer and vacuolization of the ganglion cell layer. Behind the lamina there was a simple atrophy of the nerve fibers. Nicolato gives an interesting explanation of the causes of the pathologic changes found in the glaucomatous eye. Eugene M. Blake.

Pavlov, H. M. **The pathologic anatomy and pathogenesis of congenital hydrophthalmos.** Viestnik Opht., 1937, v. 11, pt. 3, p. 354.

A report of a case. The anatomic picture is that of an embryonic pectinate ligament, absence of Schlemm's canal, inadequate differentiation of the corneoscleral trabeculae, and rudimentary development of the scleral spur. The vascular changes in the adjacent tissues lead the author to attribute the primary process to intrauterine endophlebitis in the angle of the anterior chamber, with subsequent involvement of the trophic nerves. The latter retards embryonic development, and so accounts for the embryonal character of the angle of the anterior chamber.
Ray K. Daily.

Roy, S. C. **A comparative study of field changes in different stages of epidemic dropsy glaucoma.** Proc. All-India Ophth. Soc., 1936, v. 5, pp. 142-146.

Epidemic dropsy occurs regularly in

many parts of Bengal during the rainy season. It affects only the rice-eating population and one of its main complications is chronic primary noninflammatory glaucoma.

Lawrence G. Dunlap.

Rumantzeva, A. F. **The association of simple glaucoma with congenital ocular anomalies.** Viestnik Opht., 1937, v. 11, pt. 3, p. 348.

In 1925 Frank-Kamentzki reported a hereditary, recessive, sex-linked type of glaucoma in three families, in four, three, and six generations respectively. These cases were associated with a congenital anomaly in the color of the iris, the pupillary portion being much lighter in color than the ciliary portion. Rumantzeva reports a case of this type, as well as four cases of simple glaucoma associated respectively with aniridia, with microcornea and atrophy of the iris, with coloboma of the iris and choroid, and with polycoria. (Illustrations.) Ray K. Daily.

9

CRYSTALLINE LENS

Clark, W. B., and Fish, J. W. **The Van Lint conjunctival flap in cataract extraction.** New Orleans Med. and Surg. Jour. 1937, v. 90, Aug., p. 87.

The author's method is a slight variation of the original Van Lint technique. The upper half of the conjunctiva is dissected free from the globe at the limbus upward almost to the cul-de-sac. Episcleral tissue is omitted and button-holing is avoided. Two silk sutures are used to anchor the flap well into the episcleral tissue below on each side, the sutures not touching the cornea. Corneal pressure is to be avoided. The rest of the extraction may be done as desired, and when finished the flap sutures are tied down separately.

F. M. Crage.

Dutt, K. C. **Intracapsular made easier than capsulotomy.** Proc. All-India Ophth. Soc., 1936, v. 5, pp. 82-93.

The author presents a complicated method of intracapsular extraction with two instruments which produce pressure and counterpressure. This he calls the fish-angling lever action intracapsular method. Lawrence G. Dunlap.

Gandolfi, Carlo. **A freely movable formation in the anterior chamber of traumatic origin.** Boll. d'Ocul., 1937, v. 16, Oct., pp. 1076-1083.

Four years after extraction of a cataract from the right eye, a man of 75 years showed a small round mass of the same color as the iris which moved freely in the anterior chamber in the same direction as movements of the head. Histologic examination of the extracted mass showed that it was a fragment of iris which had remained in the chamber at the time of the operation and had undergone lipoid degeneration. (Bibliography and 4 figures.)

M. Lombardo.

Giridhar, P. D. **Incision with conjunctival bridge in cataract extraction.** Proc. All-India Ophth. Soc., 1936, v. 5, pp. 94-98.

Giridhar urges that in making a conjunctival bridge it should be kept on the nasal side or inner third of the corneal incision and should be as narrow and as long as possible. It lessens the chance of iris prolapse and postoperative infection, precludes the cornea folding on itself, and decreases loss of vitreous. Lawrence G. Dunlap.

Graves, Basil. **Technique of cataract extraction during narcosis.** Brit. Med. Jour., 1937, Aug. 14, pp. 319-321.

Sufficient mental shock is caused by operations done on the eyes of elderly persons while conscious for surgical

narcosis to be definitely indicated. At present the author is giving bromide by mouth in the preceding 24 hours. One dram of paraldehyde for every fourteen pounds of body weight is given by bowel an hour before the operation. Each dram of paraldehyde is dissolved in ten drams of saline. One-thirtieth of a grain of omnopon is given by hypo for each stone (14 pounds) of body weight. The patient remains asleep ordinarily for about seven to fourteen hours after the operation, thus avoiding postoperative pain. The author also gives detailed instructions for surgical technique. Ralph W. Danielson.

Helminen, Tauno. **Cataract following dinitrophenol reducing-cures.** Acta Ophth., 1937, v. 15, pt. 4, p. 490.

Five cases are reported. The cataracts developed seven to fourteen months after conclusion of the cure, matured within 3 to 7 months, were preceded by disturbances in accommodation, and made uneventful surgical recoveries. Experimentally the author could not produce cataract in rabbits by dinitrophenol or dinitroorthocresol.
Ray K. Daily.

Hildreth, H. R. **Technique of using the fluorescent lamp in cataract surgery.** Amer. Jour. Ophth., 1938, v. 21, March, pp. 299-300.

Indra, H. K. **Operative treatment of cataract in the Eye Infirmary, Medical College, Calcutta.** Proc. All-India Ophth. Soc., 1936, v. 5, pp. 64-68.

During the past five years in 1,000 extractions the typical Elschnig method has been used more and more. The pupil is dilated with four instillations of 1-percent homatropine an hour before the operation. A peripheral buttonhole iridectomy is done after delivery of the lens. Lawrence G. Dunlap.

Jackson, Edward. **Causes of senile cataract.** Amer. Jour. Ophth., 1938, v. 21, March, pp. 264-267; also Trans. Amer. Ophth. Soc., 1937, v. 35.

Koman Nayar, K. **Glycosuria and hemorrhage in operation for senile cataracts.** Proc. All-India Ophth. Soc., 1936, v. 5, pp. 102-108.

Of 388 glycosuria patients after cataract extraction 18 percent showed blood in the anterior chamber at the time of the first dressing of the eye on the fourth day, or at subsequent dressings. Following 1,030 consecutive senile cataract extractions without glycosuria, only 10 percent showed blood in the anterior chamber at the time of the first dressing and 3.5 percent had later hemorrhage. The author recommends preoperative treatment of the glycosuria, attention to oral sepsis, and administration of sodium bicarbonate and calcium lactate preoperatively. Hemorrhage which does not absorb is removed through a small keratome incision and the anterior chamber is irrigated with normal saline.
Lawrence G. Dunlap.

Shoji, Yoshiharu. **Cases and pathogenesis, of black or brown cataracts.** Arch. d'Opht.-Rev. Gén. d.Opht., 1937, v. 1, Dec., p. 1057.

Eighteen black or brown cataracts were studied, eleven of them histologically or chemically. Eighteen other black cataracts were examined by other reporters in Japan. The majority of the cases fell between the ages of fifty and eighty years. In 24 percent vision was improved after the operation. Vision was very poor, however, because of degenerative fundus conditions. Histologically, grains of pigment were found: they could best be seen when no staining was attempted. The results of these studies indicate that the pig-

ment found in black cataracts is probably melanin. Derrick Vail.

Shroff, C. N. **Modification in Smith's intracapsular cataract extraction to make it easier and safer for the conditions in India.** Proc. All-India Ophth. Soc., 1936, v. 5, pp. 75-81.

The author is convinced that the Smith-Indian cataract extraction is the operation of choice in India. He uses Van Lint-Rochat akinesis, stresses the importance of complete anesthesia, and follows the Smith technique. He reports vitreous loss in 6 percent and iris prolapse in 4 percent, without a single eye being lost.

Lawrence G. Dunlap.

Shroff, C. N. **Results of cataract extraction in diabetes.** Proc. All-India Ophth. Soc., 1936, v. 5, pp. 99-101.

The author has seen many diabetics who developed iridocyclitis after cataract extraction when the diabetes was not controlled and the urine kept sugar-free. His controlled cases presented no complications. Lawrence G. Dunlap.

Singh, S. **Treatment of senile cataract by Smith's operation,** Proc. All-India Ophth. Soc., 1936, v. 5, pp. 69-74.

In the eye department of the Civil Hospital at Amritsar, where Smith did his operation, the Smith method is even more popular today than at the time of Smith's retirement. In the Punjab during 1934, 26,364 intracapsular extractions and 2,047 capsulotomy extractions were done. The author, between 1920 and 1936, removed over 25,000 senile cataracts by the Smith-Indian method. He uses 6-percent fresh cocaine solution, six drops in the eye at intervals of five minutes. His contraindications to the Smith operation are: stout persons possessing an excess of orbital fat and having prominent eyes, who are likely to lose vitreous from pressure on the eyeball from behind; also, patients under forty years of age. Out of 1,369 senile cataracts treated in two months, 1,350 were removed successfully by the intracapsular method, although the capsule burst in 29 cases and capsulotomy was done in nineteen. The author reports 1.2 percent slight to moderate vitreous loss, 4 percent postoperative iris prolapse; and only nine eyes lost, six from septic infection of the corneal wound and three from expulsive hemorrhage.

Lawrence G. Dunlap.

Subba Rao, P. R., and Balajee Rao, S. B. **Unusual incidence of congenital cataract in a family of three brothers and two sisters.** Proc. All-India Ophth. Soc., 1936, v. 5, pp. 109-115.

Congenital bilateral cataracts occurred in four out of five otherwise healthy children born to normal healthy parents with no history of cataract in previous generations.

Lawrence G. Dunlap.

Wright, R. E., and Koman Nayar, K. **Ectopia lentis, with special reference to microphakia.** Proc. All-India Ophth. Soc., 1936, v. 5, pp. 116-122.

In southern India, practically all microphakic eyes develop glaucoma which can seldom be relieved. The misplaced lens is always accompanied by a fluid or abnormal vitreous, and often a vitreoid aqueous, owing to free communication through the stretched, dehiscent, or torn zonule. Many microphakic individuals are also arachnodactylic. The fate of these microphakic patients is nearly always blindness due to glaucoma. No case has been noted in which there was a history of direct inheritance of microphakia.

Lawrence G. Dunlap.

10

RETINA AND VITREOUS

Adrogué, E., and Tiscornia, B. J. **Retinal angiopathies in general disease.** Arch. de Oft. de Buenos Aires, 1937, v. 12, Dec. p. 815.

Of twenty-nine cases of thrombosis of the central vein or tributaries, 24 showed hypertension with high diastolic readings, aortic and pulmonary insufficiencies, and venous dilatation in the other fundus. The mechanism of the thrombosis is via arteriovenous compression. Of the eleven cases of embolism of the central artery or its branches, almost all had small hemorrhages between the papilla and macula (outside of the area of edema) and mitral disease. The presence of hemorrhages therefore does not help in differentiating embolic from thrombotic occlusion, as Dimmer and Pallat and Bedell believe. Of twenty-six cases of intravitreous hemorrhages, ten were in young people, tuberculous in the majority and luetic in 30 percent, without hypertension; and sixteen were in older persons with hypertension. There were no changes in the coagulation time and blood picture. Attention is called to the fact that no intravitreous hemorrhages have been observed in hemophilia. (Illustrated.)

M. Davidson.

Alvaro, M. E. **Surgical treatment of retinal detachment.** Trabalhos do Primeiro Congresso Brasileiro de Ophth., São Paulo, 1936, v. 1, pp. 103-109.

Since 1931 the author has operated upon eighteen cases by Safar's technique of perforating electrocoagulation. In thirteen cases reattachment was obtained, the remaining cases resulting in failure. The author uses injection of blood of the patient in the orbit after the operation, in order to immobilize the eye for a few days.

Ramon Castroviejo.

Druault, A. **Prepapillary tuft of the vitreous.** Arch. d'Opht.-Rev. Gén. d'Opht., 1937, v. 1, Nov., p. 767.

After discussion of the floating opacities frequently seen in front of the optic nerve in the region of the canal of Cloquet, and considering the diagnosis and pathogenesis and history of this condition, the author concludes that these opacities probably result from a rupture of the central canal of the vitreous with secondary retractions. He compares the fibers making up Cloquet's canal to the zonular fibers in relation to their fragility in disease processes, particularly in myopia and old age.

Derrick Vail.

Hanum, Steen. **Vitreous hemorrhages in diabetic retinitis.** Acta Ophth., 1937, v. 15, pt. 4, p. 417.

Six cases in diabetics over fifty years of age, with a tendency to vitreous hemorrhages and retinitis proliferans. There was no correlation between the hemorrhages and the severity of the diabetes. The blood pressure was increased in two cases. The author believes that arteriosclerotic changes and a change in the viscosity of the vitreous are the etiologic factors.

Ray K. Daily.

Jacobsen, Jacob. **Unique family amaurotic idiocy.** Det oftalmologiske Selskab i Köbenhavn's Forhandlinger, 1936-1937, pp. 31-35. In Hospitalstidende, 1937, Dec. 21.

The report concerns a girl, thirteen years of age, who seemed perfectly normal physically and mentally until her ninth year, when she was taken with an epileptic attack. A year later a sec-

ond attack occurred, and after that the seizures appeared often. Following the first attack, her intelligence quotient fell steadily; later there appeared a progressive loss of vision.

The ophthalmoscope showed a general retinal atrophy; the retinal blood vessels were narrow, the choroidal vessels were distinctly visible, and there were marked changes in the distribution of the choroidal pigment. The family history was negative, and there was no parental consanguinity.

D. L. Tilderquist.

Lijo Pavia, J. **Degeneration of the retina.** Trabalhos do Primeiro Congresso Brasileiro de Ophth., São Paulo, 1936, v. 1, pp. 117-123.

In cases of retinitis pigmentosa the author has found a greenish-gray substance between the vessels. Color photographs by the author in three cases here reported show this coloring. Mixed organotherapy was used in the treatment of the three cases. In the first case, in which a great amount of greenish-gray pigment was observed in the fundus, no improvement was obtained with the treatment. In the second case, in which a moderate amount of pigment was found, the improvement was slight. In the third case, in which the greenish-gray pigment was very scanty, the improvement was very marked. The author believes that the greenish-gray substance accumulated between the vessels and the retina may be a degeneration of the pigment present on the pigmented epithelium layer of the retina. Ramon Castroviejo.

Lijo Pavia, J. **Green patches in the fundus and systemic diseases.** Rev. Oto-Neuro-Oft., 1937, v. 12, Dec., p. 301.

In summing up his 29 observations, Lijo Pavia finds twenty presented cardiovascular pathology, four had pulmonary tuberculosis, two were in diabetics, two had had malaria, and one had Basedow's. Pending histopathologic study of a case, clinical observation tends to place the lesion in the choroid. In the meantime, it is suggested that studies of the fundi of cardiovascular patients in institutions where they abound may throw light on the nature and significance of green patches in the fundus. M. Davidson.

Lijo Pavia, J. **Retinal angiopathies** in general disease. Arch. de Oft. de Buenos Aires, 1937, v. 12, Dec., p. 858.

Arteriosclerosis is the consequence of hypertension, but may exist without it. In arteriosclerosis bifurcations become right-angled, while in hypertension the angle tends to be more acute. Some retinal edema is generally present and is responsible for loss of visibility of the vessels. Thrombosis may occur in both arteriosclerosis and hypertension, and may involve either artery or vein, or both simultaneously, as is believed to be the case when the hemorrhages in thrombosis are numerous. The author has succeeded in obtaining moving pictures of the retinal arterial pulse, and hopes for still better results from color films.

M. Davidson.

Lisch, Karl. **Embolism of the central artery of the retina in Buerger's disease.** Klin. M. f. Augenh., 1937, v. 99, Dec., p. 812.

Embolism of the central artery of the retina occurred in the course of Buerger's disease, and presumably as a complication of the latter.

F. Herbert Haessler.

Mandels, S. I. **A case of juvenile vitreous hemorrhage.** Viestnik Opht., 1937, v. 11, pt. 3, p. 408.

A case of vitreous hemorrhage in the right eye and retinitis proliferans in the left eye, on the basis of a tuberculous retinal periphlebitis.

Ray K. Daily.

Mehkri, M. S., and Krishnamurthy, K. **Congenital retinal fold.** Proc. All-India Ophth. Soc., 1936, v. 5, pp. 170-173.

The patient, aged 43 years, came with vision of fingers at 1.25 m., not improved with glasses. From the place of emergence of the blood vessels, on the disc, a white fold with shining edges and about one-fourth disc diameter in breadth coursed temporalward in the 8-o'clock direction across the fundus, with branches from the superior borders of the fold. Three d.d. from the disc the fold became a tube and left the retina. The tube spread out and then narrowed down and split into a fan-shaped structure with five processes, four attaching themselves in the region of the ora serrata, the fifth forming an irregular posterior-capsular lens opacity. The author gives Ida Mann's explanation of the exact origin of retinal folds. The abnormal persistent hyaloid artery is thought to run through these folds. Only the inner layer of the optic cup is involved in the formation of the folds, the pigmented layer being unaffected.

Lawrence G. Dunlap.

Merkulow, I. J. **On pseudoalbuminuric retinitis in tumors of the brain.** Acta Ophth., 1937, v. 15, pt. 4, p. 406.

In eight cases of brain tumor the author found in addition to papilledema the fundus picture of albuminuric retinitis. In speculating on the pathogenesis the author reviews the various theories relative to the pathogenesis of albuminuric retinitis. He concludes that this phenomenon in tumors of the brain as well as true albuminuric retinitis is due to a circulating toxin acting on an area whose resistance is reduced by inadequate blood supply.

Ray K. Daily.

Mukerjee, S. K. **Diathermy in the treatment of detachment of the retina.** Proc. All-India Ophth. Soc., 1936, v. 5, pp. 176-180.

The author reports five cases treated with ten operations during the past year by the technique of Larsson of Stockholm. Twenty or more coagulation points were used and a central 1.5-mm. trephining of the sclera was followed by perforation of the choroid with a fine needle. The best vision obtained was 6/36.

Lawrence G. Dunlap.

Narayana Rao, B. K. and Vasudeva Rao, S. **Operative treatment for detachment of retina.** Proc. All-India Ophth. Soc., 1936, v. 5, pp. 181-185.

For the comparatively thick and tough Indian sclerae, the authors used modified Safar's electrodes to operate on sixteen unilateral myopic and traumatic cases of detachment of the retina. Only in one case did they operate twice. Out of sixteen cases, they report four cures and ten improvements, criterion for cure being improvement of vision to not less than 6/60, though in some the vision improved to 6/6. Eleven cases were done by combined chemical or thermal cautery in addition to diathermy. The duration of detachment in these cases ranged from five to eight years. Six were in emmetropes and ten in myopes. Among the six emmetropes, four detachments were traumatic. Of the sixteen cases, thirteen were in males. Ten detachments were in the right eye and six in the left. Thirteen of the retinas were reattached. There were no late hemorrhages, no sepsis or vom-

iting. The authors believe the prognosis poor in delayed myopic cases with other complications.

Lawrence G. Dunlap.

Safář, Karl. **Retinal detachment with holes at the posterior pole healed by means of diathermic stippling**. Zeit. f. Augenh., 1937, v. 93, Dec. p. 261.

In three patients with detached retina and a hole at the posterior pole, the lesion healed after diathermic stippling. All patients were able to read ordinary or fine print after healing was complete. The author uses a curved electrode attached to a May battery-in-handle ophthalmoscope. The diagnosis is frequently difficult and, to be sure of the macular hole, one must use special procedures such as monochromatic light, Lindner's single-objective vitreous microscope, or at least a particularly strong source of light for ophthalmoscopy.

The diagnosis and treatment in each of the three patients is described in detail. F. Herbert Haessler.

Steegman, A. T., and Karnosh, L. J. **Infantile amaurotic family idiocy.** Amer. Jour. Psychiatry, 1936, v. 92, May, p. 1413.

The retinal changes in a case of amaurotic family idiocy seemed to agree with the observations of numerous investigators including Szymanski, Mohr, Poynton, Parsons, and Holmes. The authors believe that the increased gliosis in the Henle fiber and outer reticular layers in the thickened macular area may be a phenomenon of reaction to prolonged edema.

F. M. Crage.

Vasudeva Rao, S. **Four cases of thrombosis of retinal vein.** Proc. All-India Ophth. Soc., 1936, v. 5, pp. 186-193.

Two cases of unilateral and bilateral thrombosis of the retinal vein are reported. The first bilateral case, without known cause, was in a student aged seventeen years and the second was in a man of 32 years one month after a mastoid operation. The prognosis as to vision is unfavorable if the central vein is involved, and secondary glaucoma frequently follows. The prognosis as to life is also grave. Treatment with subconjunctival injections of adrenalin and X ray is recommended.

Lawrence G. Dunlap.

Vasudeva Rao, S. **Persistent hyaloid artery**. Proc. All-India Ophth. Soc., 1936, v. 5, pp. 164-169.

Rao reports two cases of persistent hyaloid artery with no subjective symptoms. He describes the typical funnel-shaped grayish-white fibrous tissue extending from the disc to the posterior lens surface medial to the center of the lens. Both cases were unilateral and there was no visual defect and no blood circulated through the artery. There was an associated posterior opacity of the lens in each case but no concomitant anomaly such as coloboma, aniridia, persistent pupillary membrane, microphthalmia, or hydropthalmia. Detection of the fetal remnants was accidental. Lawrence G. Dunlap.

Wilson, R. P., and Lyons, F. M. **Interesting macular changes with cilioretinal anastomosis.** Giza Mem. Ophth. Lab., 1936, 11th rept., pp. 89-90.

A female aged thirteen years, with no history of disease or trauma, was found during school vision tests to have at the right macular area a large grayish-white mass heaped up and projecting into the vitreous, with a deep funnel-shaped pit in the center extending below the general level of the

retina, and some patches of old pigmentation scattered irregularly throughout the mass.

A large branch of the superior temporal artery swept around in an even curve and dipped straight into the central pit to disappear through the floor. A corresponding vein, passing underneath the artery, emerged from the floor of the pit and coursed out toward the upper temporal periphery. The eyeground was of a peculiar brown color and the disc somewhat pinker than normal. The media were clear. There was a venous connection between the superior temporal vein and the vein emerging from the macula. The anomaly was believed to be congenital in origin. Nystagmus was present. Such a picture could be accounted for by an inflammatory process.

Lawrence G. Dunlap.

Wright, R. E., and Koman Nayar, K. **Congenital retinal fold.** Proc. All-India Ophth. Soc., 1936, v. 5, pp. 174-175.

The authors report two cases of congenital retinal fold. One was bilateral with the fold running in the right eye at 45 degrees and in the left eye at 135 degrees. The other case was in the left eye only, the fold spreading outward and upward.

Lawrence G. Dunlap.

11

OPTIC NERVE AND TOXIC AMBLYOPIAS

Adrogue, E., and Reca, A. **Leber's hereditary optic atrophy.** Arch. de Oft. de Buenos Aires, 1937, v. 12, Nov., p. 771.

Observations on two families are reported. Of the three generations of one family, the first presented two psychopathies and one optic atrophy, the second generation two brothers and one sister with optic atrophies, and the third a congenital luxation of the hip. In the second generation the disease appeared at puberty. There were large cecocentral scotomata, suggestive of toxic retrobulbar neuritis, with a bitemporal dominance. The second family had a history of poor vision and deaf-mutism in one member of the first generation, and in two brothers and one sister of the third, with optic atrophies and central scotomata. In the males, because of the nystagmus, it is assumed that the disease began in infancy in the second family. The authors do not believe that the hypophysis plays a rôle in the affection and are more inclined toward the theory of a retrobulbar neuritis with chiasmal arachnoiditis, with either an hereditary predisposition toward inflammatory arachnoidal involvements or an abiotrophy, in order to explain the familial hereditary nature of the affection.

M. Davidson.

Holmes, Gordon. **The prognosis in papilledema.** Trans. Ophth. Soc. United Kingdom, 1937, v. 57, pt. 1, p. 3. (See Amer. Jour. Ophth., 1937, v. 20, Nov., p. 1173.)

Kreuzeder, Rudolph. **Hereditary optic atrophy with inflammatory and degenerative retinal changes, and disturbances of the pyramidal and coördinating tracts during childhood in a pair of single-ovum twins.** Klin. M. f. Augenh., 1938, v. 100, Jan., p. 42.

The title is fairly descriptive of an essential change in a pair of twins. The author discusses their family history, the diagnosis of their single ovum origin and the differential diagnosis of the clinical picture of which his patients are an example. He quotes copiously from the literature. The most

probable diagnosis is an optic atrophy resulting from inflammatory (infectious) neuroretinitis. The differentiation from familial and hereditary macular degeneration (Behr), pure Leber's atrophy, and degeneration of the tapetoretinal system (retinitis pigmentosa) are discussed. Despite some atypical findings, the disease observed by the author most nearly resembles the complicated familial and hereditary optic atrophy described by Behr.

F. Herbert Haessler.

Ponomarev, S. P. **Ocular neurodystrophic disturbances caused by plasmocide.** Viestnik Opht., 1937, v. 11, pt. 3, p. 406.

A report of five cases of optic atrophy following the administration of plasmocide. This antimalarial agent is a specific opticotropic poison, which because of its cumulative action may be toxic even in therapeutic doses.

Ray K. Daily.

Stern, R. O. **Tumor of the optic nerve, chiasma, and thalamus.** Proc. Royal Soc. of Med., 1937, v. 30, July, p. 90.

A four-year-old girl was admitted to the hospital because of weakness of the legs, unsteadiness in walking, and incontinence of urine. A midline cerebellar tumor was suspected. An occipital decompression was done and the cerebellum explored. No tumor was found. The child died twelve days after the operation. Postmortem examination showed a tumor of the optic nerve, chiasma, and thalamus. The histologic appearances of the tumor suggested that it should be classed as a spongioblastoma polare, as it conformed closely to the description of that tumor of the optic nerve given by Bailey and Eisenhardt (Jour. Comp. Neurol., 1932, v. 56, p. 391).

Ralph W. Danielson.

12

VISUAL TRACTS AND CENTERS

Boudier, F. and Trotot, R. **A case of homonymous hemianopsia with disturbed color vision raising the question of color memory.** Bull. Soc. d'Opht. de Paris, 1937, Jan., pp. 12-19.

A case of right homonymous hemianopsia, preservation of the macula (except for colors), and incomplete loss of color vision extending over the entire fields. There were associated verbal blindness, loss of orientation, and loss of recent memory. There were no motor disturbances. The patient was able to separate the primary colors by the stronger color tests by transmittent light but not by the reflection tests. Current theories of color vision are discussed and the existence of a memory center for color is suggested. Similar cases reported invariably occur in right homonymous hemianopsia associated with psychical disturbances such as alexia, agnosia, and aphasia. The centers for these activities are more or less definitely placed on the lateral surface of the left occipital lobe; by deduction the center for color vision is located in this area and comprises part of the psycho-visual center (18th area of Brodman). This is clearly distinct from the zone of the sensory visual center which is located in the calcarine fissure (17th area of Brodman).

Harmon Brunner.

Muskens, L. J. J. **Cortical innervation of ocular movements in the horizontal plane.** Arch. of Ophth., 1937, v. 18, Oct., pp. 527-531.

The author points out some discrep-

ancy in the reasoning of Spiegel and Scala in a recent article on this subject. While admitting that the nucleus commissurae posterioris plays an important part in the mechanism of horizontal ocular movement, as does also a lateral nucleus in the globus pallidus as a tertiary center, they state that much uncertainty exists concerning the cortical innervation of the ocular muscles. However, consideration of the results of their experiments shows that they have taken for granted the existence of cortical centers for ocular motion and consider that these stimuli are conducted by the internal capsule.

J. Hewitt Judd.

Newman, E. W. **Ocular signs of intracranial disease in children and juveniles.** Amer. Jour. Ophth., 1938, v. March, pp. 286-292.

Stotler, W. A. **Innervation of the intrinsic muscles of the eye: an experimental study.** Proc. Soc. for Exper. Biology and Med., 1937, v. 36, May, p. 576.

All nerve fibers in the ciliary and sphincter muscles degenerate following extirpation of the ciliary ganglion. All nerve fibers to the dilator pupillae degenerate after extirpation of the superior cervical ganglion. The terminal nervous structure in these muscles is not independent of the axons but undergoes degeneration with the latter, following extirpation of their cells of origin. Terminal branches of the axons seem to enter the cytoplasm of the muscle cells. Edna M. Reynolds.

Tsang, Yu-Chuan. **Vascular changes in the lateral geniculate body following extirpation of the visual cortex.** Archives of Neurology and Psychiatry, 1936, v. 36, Sept., p. 569.

The author describes experiments made on rats, showing that wounds, foreign bodies, dead cells, and other injurious agents usually cause reactions in body tissue in which blood vessels and contents are important.

The visual area of the cerebral cortex in ten rats was removed, in seven on one side. From eleven to 153 days after operation a mixture of carmine and gelatin was injected into the blood vessels of the brain of each animal. The same mixture was injected into the brains of three rats from eleven to 98 days after depriving them of the right eye. Microscopic findings were as follows: In the dorsal nucleus of the lateral geniculate body on the side of the lesion the vascularity was increased in most cases. Afferent vessels were enlarged, permeability heightened, and thickening of the capillary network was apparent. These vascular changes seemed not to depend on the size of the lesion, the location of the injury, or the period of degeneration (11 to 153 days). The vascular changes spread to other parts of the thalamus in animals with extensive lesions. In the ventral nucleus of the lateral geniculate body no changes occurred. In from eleven to 98 days after enucleation of one eye no noticeable vascular changes were found in the lateral geniculate body on the same or opposite side.

M. E. Marcove.

Wilson, R. P. **Pituitary tumor with typical field changes and unusual neurological signs.** Giza Mem. Ophth. Lab., 1936, 11th rept., pp. 90-94.

A male aged 22 years developed severe neuralgic pains centered over the right frontal area, and two weeks later noted progressive loss of vision of the right eye only. A large centro-

cecal scotoma and slight contraction of the peripheral field were soon followed by right third-nerve paralysis, ptosis, divergence, pupillary inactivity, and hemianopsia. The pituitary fossa was white and shallow and the clinoid processes were not seen in the X-ray picture. Treatment was refused, and a year later the patient had only light perception in a limited nasal area.

Lawrence G. Dunlap.

Wilson, R. P., and Lyons, F. M. **Xanthomatosis bulbi associated with cerebral signs.** Giza Mem. Ophth. Lab., 1936, 11th rept., pp. 84-88.

A boy aged fifteen years ran a moderate intermittent fever for one month, and developed exophthalmos, diplopia, constant headache, and progressive loss of vision. Four months later he had bilateral papilledema, increased intracranial pressure, and erosion of the posterior clinoid processes and dorsum sellae, with constant headache and frequent vomiting. X-ray therapy caused immediate improvement of the symptoms, but the right eye was blind.

One month later xanthomatosis caused the cornea of the right eye to become opaque and yellow. The left fundus showed secondary optic atrophy, fibrous strands extending from the disc into the vitreous, perivascular sheathing of the neighboring vessels, a degenerated macula, contracted field of vision with relative central scotoma, and vision of 6/12.

Lawrence G. Dunlap.

Woods, A. C. **Ocular manifestations of intracranial tumors.** Southern Surgeon, 1936, v. 5, April, p. 91.

The author discusses the ocular findings and their significance. The final diagnosis must be made from the symptoms, the neurologic findings, ventriculography, and the eye findings. The author further discusses the differential diagnosis between choked disc and optic neuritis. The vision in choked disc may persist for a long time. Choked disc is only an evidence of intracranial pressure and not necessarily of brain tumor. It is almost always present with subtentorial tumors and tumors of the posterior fossa. Tumors of the midbrain usually cause choked disc early by blocking the intraventricular flow. In discussing the localizing significance of field changes, the author discusses the field pictures produced by lesions in each part of the visual tract. The various syndromes produced by tumors of the brain stem are given, with the location of the tumor in each syndrome.

M. E. Marcove.

13

EYEBALL AND ORBIT

Bass, A. L. **Hemangioma of the orbit.** Kentucky Med. Jour., 1936, v. 34, Nov., p. 499.

Hemangioma of the orbit was seen in a nine-year-old boy. The treatment consisted of two radium applications at about three-week intervals. This had practically no effect. Carbon dioxide snow was applied from one to two minutes, three times, at about ten-day intervals; also without effect. An operation was performed and a large sac dissected down to the sphenoid fissure before the sac ruptured. It contained about 6 c.c. of amber-colored fluid. The pathologic report showed dilated sinuses lined with endothelium and filled with blood. (Discussion.)

M. E. Marcove.

Brain, W. R. **Exophthalmic ophthalmoplegia.** Trans. Ophth. Soc. United Kingdom. 1937, v. 57, p. 107.

The author describes exophthalmic ophthalmoplegia as a syndrome as it appears not uncommonly postoperatively in the absence of thyrotoxicosis, and usually as a disorder of middle age. The exophthalmos and ophthalmoplegia develop simultaneously in one or both eyes in the course of three or four months. The ophthalmoplegia is a paresis of movement of the eye in a particular plane. Experimentally the thyrotropic hormone of the pituitary will produce exophthalmos in animals and the author feels that this may be true in the human. Beulah Cushman.

Charamis, J. S. **Marfan's syndrome.** Arch. d'Opht.-Rev. Gén. d'Opht., 1937, v. 1, Dec., p. 1067.

A girl of nine years presented the typical picture of Marfan's syndrome, showing megalophthalmos anterior, the cornea measuring 13.3 mm., the anterior chambers deeper than normal, pupillary action normal, and pupils dilating widely under a mydriatic. There were, in addition, essential atrophy of the stroma of the iris, and iridodonesis. Both lenses were subluxated and showed early cataractous changes. Arachnodactylia showed in hands and feet. X-ray of the bones showed findings as reported by other authors. (Illustrations.)

Derrick Vail.

Folk, M. L. **Plastic surgery of the orbit.** Illinois Med. Jour., 1936, v. 70, Nov., p. 419.

The author gives numerous practical points concerning the preoperative, operative, and postoperative care of plastic surgery of the lids and orbit. He describes eight cases including cicatricial ectropion, entropion, symblepharon, exophthalmos, coloboma, nevus of the lids, and shrunken eye sockets. The operations are briefly described and pictures before and after the operative procedures are shown. (Discussion.) M. E. Marcove.

Franta, Jira. **Pulsating exophthalmos.** Ceskoslovenska Ofth., 1937, v. 3, no. 1, pp. 62-64.

A 67-year-old man suddenly had a hissing noise in his left ear, and noticed diminution of vision of the left eye. This was followed immediately by weakness and dizziness. Within two hours the eye began to proptose and the lids swelled. The patient had atheroma of the aorta, dilatation of the left side of his heart, and high blood pressure. The blood Wassermann was negative. A month later there was spontaneous remission of the principal symptoms—exophthalmos, pulsation, aneurysmal sounds. Severe corneal changes occurred, due to disturbed nutrition.

Georgiana D. Theobald.

Fry, W. E. **Inflammatory pseudotumor of the orbit.** Pennsylvania Med. Jour., 1936, v. 39, Sept., p. 945.

The author reviews the literature. These tumors are characterized by rapid proptosis without the usual symptoms of inflammation. There is loss of mobility of the globe, swelling of the lids, and chemosis. As the retrobulbar tissue increases it becomes firm so that the globe cannot be pushed back into the orbit. Histologically the tumor consists of connective tissue made up of young and old fibrocytes and hyaline tissue, with which are localized masses of small round cells with a few plasma cells. Treatment consists in antisyphilitic medication, radiation, or operation. About one half of the cases come to operation.

The left eye of a 27-year-old male

became progressively proptosed, and he complained of severe headache and orbital pain. The left eyelid was swollen. An exploratory incision was made through the brow ten days after admission because of progression of the symptoms. No pus was found but a hard mass was felt at the apex of the orbit. Later the orbital contents were removed and the apex was found to be completely filled with a dense firm mass. Pathologic report was of a chronic inflammatory tissue. (Discussion.) M. E. Marcove.

Gamble, R. C. **Orbital abscesses.** Arch. of Ophth., 1937, v. 18, Oct., pp. 633-641.

As etiologic factors of orbital inflammation, the author discusses the extension of infection from adjacent tissues, trauma, and bacteremia. The pathologico-anatomic features, signs, complications, and treatment of acute orbital inflammations are discussed. J. Hewitt Judd.

Giqueaux, R. E. **Retrobulbar hydatid cyst.** Arch de Oft. de Buenos Aires, 1937, v. 12, Nov., p. 726.

Aspiration of the contents and daily irrigations with 5 percent formaldehyde, finally reduced to 1 percent, have been found effective in dealing with a cyst the size of a large walnut. Because of infection following diagnostic puncture, the treatment was complicated, and drainage and curettage of the sac were employed. Among the interesting features in this case, the author calls attention to absence of pain, and absence of eosinophilia the day following the puncture. The exophthalmos disappeared permanently and vision recovered from 0.1 to normal. M. Davidson.

Gougelman, Paul. **Fitting of prostheses for patients with cryptophthalmos and extreme microphthalmos.** Arch. of Ophth., 1937, v. 18, Nov., pp. 774-776.

In these cases the stump is small but as the muscles are intact it is possible to fit a proper sized prosthesis which is replaced by progressively larger ones as growth occurs. No ill effects have been seen following this and the fear of sympathetic ophthalmia appears to be unfounded. It is urged that prostheses be fitted even in very young infants in order to stimulate the development of the lids and bony structures and to prevent deformation and shrinkage. J. Hewitt Judd.

Grönvall, Herman. **Citric-acid studies referring to the eye.** Acta Ophth., supplement 14, 1937, v. 15.

A review of the literature, a detailed description of the technique of this laboratory investigation, and a tabulated report of 600 citric-acid estimations in the ocular tissues. The author augmented the accuracy of his results by substituting indigo trisulphate for methylene blue in the enzymatic-chemical method of Thunberg. The investigation shows an extensive distribution of citric acid in the aqueous humor, the vitreous body, and the blood serum of birds and mammals. The aqueous and vitreous of birds have a higher citric-acid content than those of mammals and fish. Its concentration in these structures in the human does not differ from that of other mammals. The citrate content of the aqueous is higher than that of the vitreous. The fact that it is the same in both eyes leads the author to believe that it is regulated by a sensitive mechanism. The citrate concentration is higher in

fetuses and new-born animals than in adult animals. There was no deviation in the citrate content of the aqueous in aphakic eyes and eyes with cataract. In iridocyclitis, glaucoma, and melanosarcoma of the choroid the citrate content was found higher. The plasmoid aqueous of rabbits, such as is found after punctures of the anterior chamber, showed a higher citrate content, while in herpes and infected eyes it was lower. In experimental hypercitricemia in rabbits the citrate content of the aqueous and vitreous rises, and also returns to normal, somewhat more slowly than in the blood serum. The author thinks the citrate is linked to the protein. Elimination of light by suture of the lids for sixteen days produced a fall in the citrate content of the aqueous of a rabbit.

Ray K. Daily.

Heymann, H. **Protrusion of the globe in carcinoma of the parotid gland and the base of the skull.** Klin. M. f. Augenh., 1938, v. 100, Jan., p. 23.

The author describes the clinical findings and histologic study of tissue obtained for biopsy from a patient who had protrusion of one eyeball. A carcinoma of the parotid gland had proliferated upward through the middle cranial fossa and forward and upward toward the right orbit.

F. Herbert Haessler.

Malan, Arnaldo. **Tuberculoma of the orbit.** Rassegna Ital. d'Ottal., 1937, v. 6, Sept.-Oct., p. 529.

Malan reports two cases of orbital tuberculoma, one occurring in a man of 41 years, who had previously suffered a slight traumatism of the upper orbital rim, the second in a fourteen-year-old boy, after removal of the tear sac. The former case involved the lacrimal gland. Microscopically the tissues examined showed tubercles and the typical picture of a chronic tuberculous process, but no bacilli.

Tuberculoma of the orbit develops slowly, affects mostly adults and more often women than men. There is frequently a history of trauma and less often of pulmonary disease. The prognosis after surgical removal is good. (3 figs.)

Eugene M. Blake.

Paulson, D. L. **Experimental exophthalmos in the guinea pig.** Proc. Soc. Exper. Biol. and Med., 1937, v. 36, June, pp. 604-605.

This research was done to verify the work of Smelser, who described a stainable infiltrate occurring between the fat cells and muscle fibers, and in the lobules of the lacrimal gland; and in the connective tissue of the orbit in thyroidectomized guinea pigs injected with thyrotropic hormone. After considerable discussion of the results it is concluded that the pathology in the extraocular muscles appears to be similar to that accompanying progressive exophthalmos in man as described by Burch and Naffziger.

Ralph W. Danielson.

Randolph, M. E. **An analysis of 71 consecutive cases of unilateral exophthalmos.** Amer. Jour. Ophth., 1938, v. 21, Feb., pp. 169-176.

Sautter, Hans. **Inflammatory pseudotumor of the orbit in two patients with unilateral exophthalmos.** Klin. M. f. Augenh., 1938, v. 100, Jan., p. 29.

In two patients with unilateral exophthalmos, a chronic phlegmonous infiltration of the orbital tissue was found at biopsy. The etiology and pathogenesis were not elucidated and

the findings are similar to other reports in the literature. The author favors retaining the name "inflammatory pseudotumor of the orbit." The process may be exogenous from infected orbital wounds, an extension of sinus infection, metastatic, or of entirely unknown etiology. F. Herbert Haessler.

Schreck, Eugene. **On the question of anophthalmos congenitus.** Klin. M. f. Augenh., 1938, v. 100, Jan., p. 74.

The author describes clinically and histologically a mass, removed from the orbit of a seventeen-year-old girl, which was associated with a coloboma in the lower lid. A diagnosis of anophthalmos had been made. However, the arrangement of cells was such that a primitive anlage of sclera, choroid, and retina could be identified with great probability. Without histologic study, it is impossible to distinguish true anophthalmos in which no eye tissue whatever exists from a pseudoanophthalmos which is merely diagnosed clinically because no eye anlage has been discovered. Of the former, only fifteen have been reported. Nine occurred in animals and only three in actually growing human beings.

The causes of anophthalmos are a matter of conjecture. The association of other malformations such as coloboma, orbital cysts, and microphthalmos suggests a congenital anomaly, but mechanical effects such as amniotic adhesions have been held responsible. Trauma and roentgen radiation have also been mentioned as etiologic factors.

The relationship to orbital teratoma is also mentioned by the author. Teratomata of the orbit are usually very malignant and grow rapidly. They are divided into four groups. The simplest embraces those intraorbital masses that contain elements originating from two or more primitive embryonic layers. The second group consists of a similar mass which protrudes from the orbit. In the third, parts of a fetal body protrude from the orbit. The most complex is the orbitopagus described by Mizuo, which consisted of a complete fetus with an umbilical cord implanted in the orbit. (Extensive bibliography.) F. Herbert Haessler.

Stone, L. S., and Chace, R. R. **Further experiments on the grafted eye and the regeneration of the lens in amphibians.** Proc. Soc. Exper. Biol. and Med., 1937, v. 36, June, pp. 830-831.

When an eye is reimplanted there is some reduction of its size, followed by a degree of recovery. When the eye is reimplanted the lens disintegrates as shown in previous experiments on adult amphibians. The new lens in this type of experiment begins to develop from the dorsal part of the pupillary margin of the iris from eighteen to twenty days after the operation. In those cases where the optic nerve is severed the regeneration of the nerve is rapid. Three specimens selected for tests for return of vision in the operated eye showed visual function 63, 65, and 70 days respectively after operation. (5 references.) Ralph W. Danielson.

Voisin, Jean. **Mechanism and pathogenesis of the Graefe sign.** Ann. d'Ocul., 1937, v. 173, Oct., pp. 666-672.

A discussion of the correlation between motions of the upper lid and globe. Voisin considers that the upper lid plays a passive rôle in looking down, being influenced by the action of the globe and the inferior rectus on both lids. The smooth muscle fibers of the lids modify this effect. Graefe's sign results from hypertonicity of the

retractor muscles. The sign is not specific for Basedow's disease but may be present in any condition causing such hypertonicity. John C. Long.

14

EYELIDS AND LACRIMAL APPARATUS

Alvaro, M. E. **Treatment of dacryocystitis with Besredka antivirus.** Rev. Oto-Neuro-Oft., 1937, v. 12, Dec., p. 306.

Considering the inapplicability of strong antiseptics to the delicate conjunctival mucosa and lacrimal passages, Alvaro believes the Besredka antivirus a useful agent in combating infections of the lacrimal sac. He employs it for irrigation of the passages as well as parenterally. There may be a focal reaction in the region of the lacrimal sac, lasting 24 hours, and in some cases a local reaction at the site of the parenteral injection, also lasting about a day. In five cases treated, the effects were uniformly encouraging, with disappearance of secretion after about five applications at three-day intervals. M. Davidson.

Cotlier, I. **Treatment of bilateral clonic lid-tics by psychomotor reëducation.** Arch. de Oft. de Buenos Aires, 1937, v. 12, Nov., p. 721.

The following method has produced lasting cures in from 25 days to two months in three cases of continual winking habit in children. Three times a day the child is asked to fix a distant object, keeping the eyes open until a signal is given to close them. The interval is at first five seconds. By increasing it daily by two seconds, an interval of fifty seconds is achieved. The first treatments are given by the physician, and last four or five minutes. The treatments may then be carried out at home and the sessions increased to half an hour. It is essential to encourage the child and to avoid scolding.
M. Davidson.

Gozberk, A. R. **Palpebral manifestations of late heredosyphilis.** Ann. d'Ocul., 1937, v. 174, Dec., pp. 837-844.

Two cases of destructive heredosyphilitic lesions are recorded. A boy of eleven years developed nodules of the lids, zygomatic region, and the bridge of the nose, following trauma to the left lid. Ulceration of these nodules resulted in loss of the lids and deep destruction of the tissues of the cheek and nose. Healing of the ulcerations rapidly followed injection of neosalvarsan and bismuth. A man of thirty years developed gummas of the lid and face, after trauma. These lesions disappeared after specific treatment was started. Trauma is of considerable surgical interest as an important factor in reactivation of latent lues. In discussing differential diagnosis the author stresses the importance of the therapeutic test. John C. Long.

Gupta, M. K. **Webster's operation for entropion of the upper lid.** Proc. All-India Ophth. Soc., 1936, v. 5, pp. 199-202.

The operation is recommended because of its simplicity, fine cosmetic results, and usual success.
Lawrence G. Dunlap.

Harbert, F. **An effective operation for entropion in trachoma.** Amer. Jour. Ophth., 1938, v. 21, March, pp. 168-271.

Holth, S. **Mimical bilateral or unilateral ectropion or entropion.** Acta Ophth., 1937, v. 15, pt. 4, p. 370.

Two brothers could evert or invert their lids at will, bilaterally or unilaterally. (Illustrations.) Ray K. Daily.

Khalil, M. **Syphilitic tarsitis.** Brit. Jour. Ophth., 1937, v. 21, Dec., pp. 648-654.

Signs and symptoms, age, onset and mode of infection, diagnosis, pathology, prognosis, and treatment of four types of syphilitic tarsitis are here described; and one case is presented. Definite cure is recorded. (Photographs, bibliography.)

D. F. Harbridge.

Lewy, F. H., Groff, R. A., and Grant, F. C. **Autonomic innervation of the eyelids and the Marcus Gunn phenomenon.** Arch. of Neurology and Psychiatry, 1937, v. 37, June, p. 1289.

The Marcus Gunn phenomenon is described. Animal experiments were performed in which the third and fifth nerves were sectioned. The effects of nicotine, epinephrine, atropine, and acetylcholine were observed. The authors conclude that the nature of the autonomic fibers cannot be defined in detail. The possibility that the fibers in question are of a sympathetic nature cannot be excluded, since destruction of the cervical portion of the sympathetic trunks did not prevent the action of either acetylcholine or epinephrine.

F. M. Crage.

Mitter, S. N. **A case of syphilitic tarsitis.** Proc. All-India Ophth. Soc., 1936, v. 5, pp. 194-196.

A Hindu female aged 25 years, unable to open her eyes on account of bilateral swelling of the lower lids, was found to have both lower tarsi uniformly thickened and hard, and enlarged preauricular and anterior cervical glands. After seven days of antisyphilitic treatment, the masses had softened and the patient could easily open one eye. The lids were normal within one month.

Lawrence G. Dunlap.

Shevelev, M. M. **Vertical section and shaving of the palpebral cartilage in trachomatous entropion.** Viestnik Opht., 1937, v. 11, pt. 3, p. 383.

A description of the various surgical procedures for trachomatous entropion. (Illustrations.)

Ray K. Daily.

Skydsgaard, H. **Acute dacryoadenitis resulting in leptomeningitis.** Det oftalmologiske Selskab i Köbenhavn's Forhandlinger, 1936-1937, pp. 39-42. In Hospitalstidende, 1937, Dec. 21.

A boy, nine years old, complained of pain in the left eye for four days. There were marked swelling, redness, and tenderness of the eyelids, especially the upper. Exophthalmos and limitation of the movements of the eye appeared on the second day. On the next day the boy became delirious, and lumbar puncture yielded a cloudy fluid. Exitus took place on the fourth day. The autopsy diagnoses were acute dacryoadenitis, retrobulbar abscess, thrombophlebitis of the cavernous sinus, all on the left side, and basal leptomeningitis. Extension of an infection of the tear gland into the orbit is very rare.

D. L. Tilderquist.

Slesinger, H. A. **Xanthomatosis.** Pennsylvania Med. Jour., 1936, v. 39, July, p. 779.

The author gives a short résumé of this disease, and presents a case of generalized xanthomatosis or Schüller-Christian's disease. Physical examinations, laboratory findings, X-ray reports, biopsy reports, and the effects of deep X-ray and radium treatment are included. There was no improvement after deep roentgen-ray therapy. Radium brought about a temporary improvement. (Roentgenograms. Plates.)

F. M. Crage.

Strelkov, A. G. **Large lacrimal probes.** Viestnik Opht., 1937, v. 11, pt. 3, p. 391.

A description of the technique of forcible dilatation of the lacrimal canal.

Ray K. Daily.

Tzitovskii, M. L. **The correction of ptosis by implantation of fascia lata.** Viestnik Opht., 1937, v. 11, pt. 3, 373.

A report of six successful cases. The author uses one incision through the lid, and sutures the lower end of the fascial strip to the lower border of the lid. (Illustrations.)

Ray K. Daily.

Vila Ortiz, J. M., and Imbern, S. **A contribution to the subject of so-called bloody tears.** Arch. de Oft. de Buenos Aires, 1937, v. 12, Nov., p. 711.

In the two cases reported the source of the blood was evidently the palpebral conjunctiva, where hemorrhagic points were noted. Both patients were females, one of 38 years suffering from dysmenorrhea, the other seven years of age showing evidence of vasomotor instability and delayed coagulation time.

M. Davidson.

Yris, J. M. **Clinical history of a case of American leishmaniosis of the eyelids.** Anales de la Soc. Mexicana de Oft., 1937, v. 11, Jan.-March, pp. 173-178.

The patient came from an area where leishmaniosis was common. There was a circular ulcer of the lower lid, with sharp edges, a red aureola of surrounding skin, and a delicate yellowish film in the depth of the ulcer. There were enlarged glands in the neck. Bacteriologic examination showed a diplococcus, possibly that of Seidelin, which is commonly associated with the disease and has an important diagnostic significance. The ulcer healed under intravenous injections of the double tartrate of antimony and potassium, and local use of an ointment containing aniline dyes. W. H. Crisp.

15

TUMORS

Banerjee, H. D. **An interesting case of rhabdomyoma of the lid in a boy aged twelve years.** Proc. All-India Ophth. Soc., 1936, v. 5, pp. 197-198.

Tumors consisting of striated muscle fibers were removed from the right lower lid and the left upper lid in a boy aged twelve years. They were found to be rhabdomyomas, and did not recur.

Lawrence G. Dunlap.

Choudhuri, A. R. **Two interesting cases of tumor of the conjunctiva.** Proc. All-India Ophth. Soc., 1936, v. 5, pp. 30-34.

In a Hindu female aged 13 years, a growth of two years duration at the limbus of the right eye, 3 mm. in diameter, without history of pain or trauma, was found to be a simple granuloma. A Hindu female aged 56 years, without history of pain, irritation, or trauma, complained of a sensation as of a foreign body inside the eye. A small white fleshy growth over the bulbar conjunctiva near the limbus of the right eye, with otherwise normal eyes, was found to be an epidermoid carcinoma. Lawrence G. Dunlap.

Cohen, Martin. **Bilateral metastatic carcinoma of the choroid.** Arch. of Ophth., 1937, v. 18, Oct., pp. 604-613; also Trans. Amer. Ophth. Soc., 1937, v. 35.

A woman, aged 28 years, presented a bilateral retinal detachment due to a bilateral metastatic carcinoma of the choroid. She had undergone a radical

mastectomy one year before for a scirrhous carcinoma. There was a short interval between the involvement of the two eyes. Metastatic foci also occurred in the lungs, skull, ribs, and long bones. The eyes were removed post mortem and the microscopic findings are completely described and are illustrated by photomicrographs.

J. Hewitt Judd.

Damel, C. S., and Oneto, J. A. **Corneoconjunctival dermoid.** Arch. de Oft. de Buenos Aires, 1937, v. 12, Nov., p. 781.

An unusually large dermoid, the size of a cherry, covered with epidermis, protruding between the lids and attached by a pedicle running from the limbus to the lower lid border is described. Its interior contained a lipoma.

M. Davidson.

Koman Nayar, K., and Wright, R. E. **Late effects of radium in a case of angioma of the lid.** Proc. All-India Ophth. Soc., 1936, v. 5, pp. 247-249.

A patient, aged six months, with an angioma of the upper lid and the upper orbital margin of the left eye of five months duration and gradually increasing in size, was given 240 mg. hours of radium and seven months later 500 mg. hours. Six years later, the angioma was found to have been destroyed by the radium therapy. There was also a sector of cataractous change in the superior quadrant of the left lens. The skin of the brow was pale, thin, and scarred, the underlying bone was depressed, and there was a discharging sinus of the outer third of the left eyebrow with bony caries. The vision of the left eye was 6/36. A review of the literature is given as to the time of lens change after the irradiation, and it is noted that primary beta rays should be screened out and only gamma rays employed, and that even these are not free from risk.

Lawrence G. Dunlap.

Kreibig, Wilhelm. **Carcinoma metastasis in the eye.** Zeit. f. Augenh., 1937, v. 93, Dec., p. 278.

In a 44-year-old patient, apparently in perfect health, a nodular iridocyclitis appeared. Tebeprotein injection was followed by ocular pain and hemorrhage into the anterior chamber. Later more hemorrhages appeared and became spontaneously resorbed. The fundus remained normal. After several weeks the first subjective symptoms of a bronchial carcinoma appeared. The iris nodules began to grow rapidly, so that in two months the diagnosis of metastatic tumor was unequivocal and was corroborated by the appearance of metastatic lesions in ribs and scapula. A colored plate illustrates the eye in this stage. Histologic preparations revealed tremendous enlargement of the adjacent portion of the ciliary body. Particularly striking were the numerous carcinoma emboli in the choriocapillaris in both eyes and visible in almost every section, while none could be found in the iris and ciliary body and only one in a retinal vessel.

In retrospect, the author believes that the recurrent hemorrhage should have suggested the correct diagnosis since they rarely occur in nodular iritis. The rapidity of development is not characteristic of primary iris neoplasm.

Ocular metastasis as the first manifestation of carcinoma elsewhere in the body is a rare occurrence. Usually carcinoma metastasis occurs in the choroid and the difference in blood supply does not alone explain why the anterior uvea is so rarely involved.

F. Herbert Haessler.

Pandit, S. H. **Tumors of the orbit.** Proc. All-India Ophth. Soc., 1936, v. 5, pp. 219-222.

Pandit has seen an average of ten tumors of the orbit a year for the past twenty years. He considers sarcoma of the orbit as the most malignant tumor of the entire body and advises immediate exenteration of the orbit and removal of a generous portion of the bony orbit as soon as the diagnosis is made, regardless of vision and the ophthalmoscopic picture. He advises radium before and after the exenteration. Proptosis may be due to hemorrhage from vicarious menstruation.

Lawrence G. Dunlap.

Puscariu, Elena. **The problem of cylindroma of the orbit.** Arch. d'Opht.-Rev. Gén. d'Opht., 1937, v. 1, Nov., p. 961.

A woman of 25 years came with an enormous swelling of the left orbit. Three years before, a small swelling, roughly the size of a pea, had appeared at the outer side of the left eyeball near the orbital rim. It had continued to develop in all directions, extending backward into the orbit as well as forward. It was approximately the size of an orange, and was covered with dilated veins which showed beneath a thin skin. The lowermost portion of the swelling was fluctuant. The exophthalmos measured 34 mm. Vision was reduced to counting fingers at 20 cm. The optic-nerve head was inflamed and the outlines blurred. The veins were dilated and tortuous, the arteries constricted. The tumor was excised through a median tarsorrhaphy. Microscopic examination revealed an adenocarcinoma with hyalin transformation of the stroma which led to the diagnosis of cylindroma. The author believes from its history and position that it probably originated in the region of the lacrimal gland. (Illustrations, bibliography.) Derrick Vail.

Stallard, H. B. **A case of intraocular neuroma (Recklinghausen's disease) of the left optic-nerve head.** Brit. Jour. Ophth., 1938, v. 22, Jan., pp. 11-18.

The disease discussed is congenital, affecting males more often than females, and is slowly progressive. The disease is described and a fatal case is reported. It was from a family having a marked history of Recklinghausen's disease through two generations. A subtentorial growth affected the hearing and gait. Such intraocular lesions are rare. (Table, figures, references.) D. F. Harbridge.

Teegler, Charlotte. **Partial arcus lipoides in a conjunctival neoplasm near the limbus.** Zeit. f. Augenh., 1937, v. 93, Nov., p. 197.

In eight patients with conjunctival neoplasms contiguous to the limbus, a corneal opacity was observed near the lesion. These opacities were in the most superficial strata of the cornea or the deepest, and only in an advanced stage was the entire thickness of the parenchyma involved. Since the opacities were separated from the limbus by a zone of clear cornea and there was no vascularization, characteristics which they share with arcus lipoides, it is probable that the lesion is a fatty deposit. Interference with the limbal blood supply probably brings about the change of metabolism which is responsible for the fatty infiltration.

F. Herbert Haessler.

Watson, W. L., and Wuester, W. **General considerations in the radiation treatment of skin cancer in the region of the eye.** Amer. Jour. Ophth., 1938, v. 21, March, pp. 261-263.

Yu, C. H., and Li, P. L. **Orbital neurofibroma.** Chinese Med. Jour., 1937, v. 51, May, p. 664.

A review of the literature revealed only eleven reported cases of neurofibroma of the orbit. In this case, the origin of the tumor was not located during the operation because of the bulk of the tumor and because of profuse bleeding. The optic nerve and the eyeball were not involved. The tumor was well encapsulated, with cyst formation as a result of degeneration.

Edna M. Reynolds.

16

INJURIES

Avalos, Enrique. **Injuries at the end of the eyebrow with results in the eye.** Anales de la Soc. Mexicana de Oft., 1937, v. 11, April-June, pp. 275-282.

Six cases are cited. The first three developed progressive optic atrophy. The fourth case showed a corneal ulcer of slow development, the fifth iridocyclitis, the sixth a neuroretinitis. The author discusses theories as to possible reasons for these complications.

W. H. Crisp.

Fain, I. E. **The task of the oculist in the health department of the Kalinin railroad-coach-building factory.** Viestnik Opht., 1937, v. 11, pt. 3, p. 401.

A discussion of ocular traumatism from the standpoint of a public health officer. Ray K. Daily.

Handmann. **Total inversion of the iris from late hemorrhage after contusion.** Zeit. f. Augenh., 1937, v. 93, Nov., p. 222.

In a patient who had suffered a contusion of the eyeball, iris and pupil were observed to be in their normal position on the first two days. After a hemorrhage, presumably from Schlemm's canal and Leber's complex of veins, between the third and fourth day, the entire iris was found folded backward and entirely invisible except as to a very narrow peripheral one. Nine months later, the position of the iris had not changed. The intraocular tension was greater than normal and the eye, now blind, will doubtless soon be enucleated. F. Herbert Haessler.

Kurz, Jaromir. **Xanthomatosis of cornea and eyeball.** Ceskoslovenska Ofth., 1937, v. 3, no. 1, pp. 55-62.

A man, 45 years old, had had a perforating injury in one eye when 33 years old. Secondary glaucoma had been followed by atrophy. A year previously the same eye had had another perforating injury, and xanthomatosis had developed soon afterward. There was considerable accumulation of fat in the eyeball and cornea. The severely atrophied iris was free of fat. The author considers xanthomatosis bulbi as a local regressive degenerative change. Georgiana D. Theobald.

McCullough, C. J. **Accurate localization of foreign bodies in the eyeball.** Pennsylvania Med. Jour., 1937, v. 40, July, p. 852.

By use of a special lens and design and by conjunctival markers the eyes are fixed and the important planes and axes of the eyeball are established for X-raying intraocular foreign bodies.

F. M. Crage.

Mahlen, Sven. **Therapy of severe ocular burns with pellidol salve.** Acta Ophth., 1937, v. 15, pt. 4, p. 428.

A review of the development of scarlet-red ointment and its properties. Pellidol is chemically related to scarlet red, and is a reddish-yellow, odorless powder, insoluble in water, and freely soluble in vaseline. The author claims

that it promotes epithelization and prevents symblepharon. He reports ten cases in support of his contention.

Ray K. Daily.

Motolese, Alfonso. **Traumatic ruptures of the sclera.** Boll. d'Ocul., 1937, v. 16, Oct., pp. 987-1050.

Twenty-three cases of indirect rupture of the sclera were encountered at the Eye Clinic of Florence University among a total of 150,000 cases of eye disease examined in ten years. The ruptures, whose length varied from a few to about 10 mm., run a course according to the direction of the limbus, and 1 to 4 mm. from it. Eleven of the ruptures were located in the upper sector of the sclera, five upper-inward, five inward, one outward, and one at the lower-outward. The writer discusses the symptomatology, complications, prognosis, and treatment. (Bibliography.) M. Lombardo.

Sédan, Jean. **Prolonged simulation of "petrifying conjunctivitis."** Ann. d'Ocul., 1937, v. 174, Oct., pp. 672-678.

A girl of nineteen years was seen on numerous occasions on account of a chalky deposit in the conjunctival sac. The condition recurred frequently and at times was associated with corneal ulceration. The chalky material was introduced into the conjunctival sac by the patient. She discontinued this practice when she learned that the deception had been detected. Later the same girl deliberately tore open a recent appendectomy wound. John C. Long.

Shagov, M. A. **Protective apron for the industrial oculist.** Viestnik Opht., 1937, v. 11, pt. 3, p. 405.

The author describes a protective screen eliminating contact with the soiled clothing of factory workers.

Ray K. Daily.

Thies, Oskar. **The operative treatment of caustic injuries of the eye.** Klin. M. f. Augenh., 1937, v. 99, Dec., p. 764.

The purpose of this article of twenty pages with 22 illustrations is to acquaint the German oculists with the caustic injuries that occur in chemical industries, to illustrate the clinical course of such lesions, and to show what can be accomplished therapeutically.

It is the consensus among workers in the field that just as one can no longer neglect to operate on retinal detachment, so one cannot allow a patient with a caustic wound to await healing without operation. It is imperative very early to transplant into the burned area of conjunctiva mucous membrane taken from the lips. With careful work, one should have no failures whatsoever. The operation can be done in one-half hour with no help except that given by one nurse.

F. Herbert Haessler.

Vila Ortiz, J. M. **Acute posttraumatic conjunctivitis from the medico-legal standpoint.** Arch. de Oft. de Buenos Aires, 1937, v. 12, Nov., p. 787.

The author finds a high percentage of conjunctival lesions (including foreign bodies) in his experience with industrial eye injuries; namely 25.4 percent. Aside from the fact that subconjunctival foreign bodies may give rise to abscess formation, and that in a luetic a subconjunctival hemorrhage may provoke interstitial keratitis, there is the ever-present possibility of favoring development of or directly inoculating with an acute infectious conjunctivitis. Immediate examination of the secretion in every acute posttraumatic conjunctivitis is therefore indicated both for therapeutic purposes

and for medicolegal reasons.

On the basis of data in the literature and from personal experience, the author sets down the periods of incubation as follows: trachoma, 7 to 15 days; gonococcus, 3 to 5 days; pneumococcus, 6 to 12 hours; diplobacillus, 3 days; Koch-Weeks, 1 to 2 days; influenza, hours to 5 days; diphtheria, 1 to 5 days; measles, 8 to 12 days; scarlet fever, 3 to 5 days. These periods of incubation may however be shortened, because of the accompanying trauma. The period of disability, except for complications, is generally from one to two weeks. M. Davidson.

Wegner, W. **The surgical treatment of destruction of the trochlea.** Klin. M. f. Augenh., 1938, v. 100, Jan., p. 20.

In a patient whose orbit had been severely damaged by a blow while skiing, the author made a skin incision, similar to the one he has reported elsewhere for surgery of the superior oblique muscle, and pulled the displaced muscle from the depth of the orbit. He attached it by means of an artificial trochlea which he constructed from a loop of a non-absorbable suture material called synthophil. It is a polyvinylalcohol which is tolerated by the tissues without reaction. The functional result was entirely satisfactory.

F. Herbert Haessler.

Wostry, Milos. **Ocular trauma from lightning stroke.** Ceskoslovenska Ofth., 1937, v. 3, no. 1, pp. 69-71.

The patient fell unconscious on being struck by lightning. It was found that only his eyes were affected. The corneae were partly denuded of epithelium; lacrimation, pain, and photophobia resulted. Edema of the conjunctiva and retina developed; also a glistening exudate in the vitreous. These symptoms subsided. Two months later a disclike cataract developed under the anterior capsule. This disappeared later, leaving the patient with 6/12 and 6/15 vision.

Georgiana D. Theobald.

17

SYSTEMIC DISEASES AND PARASITES

Carmody, R. F. **Herpes zoster ophthalmicus complicated by ophthalmoplegia and exophthalmos.** Arch. of Ophth., 1937, v. 18, Nov., pp. 707-711.

The author reviews the literature and reports the case of a man aged 40 years, who presented keratitis, iridocyclitis, and total oculomotor paralysis and proptosis of the right eye as complications of herpes zoster ophthalmicus. Mobility began to return in two months and was almost complete after four months. Since the patient was syphilitic, it is difficult to say whether the condition was the epidemic type occurring in a syphilitic patient or of a symptomatic type due to syphilitic basilar meningitis. However the clinical appearance was that of inflammation of the retrobulbar tissue.

J. Hewitt Judd.

Chavira, R. A. **Ocular complications in sinusitis.** Anales de la Soc. Mexicana de Oft., 1937, v. 11, April-June, pp. 283-296.

Five cases are recorded from the eye service of the Juarez Hospital. In three cases there was orbital infection, in the first case the orbit was encroached upon by an ethmoidal empyema; in the second there was a fronto-ethmoidal sinusitis secondary to extraction of a carious molar; in the third, a postneuritic optic atrophy which was not relieved by opening of the sinus; in the fourth, an orbital periostitis from frontal sinusitis; and in the fifth, mucocele of the frontal sinus with dis-

placement of the eye downward and outward. W. H. Crisp.

Icaza, M. J. **Ocular lues and examination of the eye in relation with neurolues, and treatment of both.** Anales de la Soc. Mexicana de Oft., 1937, v. 11, April-June, pp. 267-273.

A general review of the subject.

Marbaix and Appelmans. **Keratitis of filarial origin.** Arch. d'Opht.-Rev. Gén. d'Opht., 1937, v. 1, Nov., p. 978. (See Amer. Jour. Ophth., 1937, v. 20, Sept., p. 980.)

Mukerjee, S. K. **Ocular manifestations of diabetes.** Proc. All-India Ophth. Soc., 1936, v. 5, pp. 1-9.

Changes in the retina, in the lens, in accommodation, and in the optic nerve are discussed. Lawrence G. Dunlap.

Nanavati, B. P. **Eye affections in diabetes.** Proc. All-India Ophth. Soc., 1936, v. 5, pp. 10-14.

The author believes diabetic cataract is not due to the presence of sugar in the aqueous but probably to toxins in the lymph secreted by the ciliary body, or circulating in the blood. Complications likely to occur after extraction of cataracts in diabetes are discussed, as well as ocular muscle paralyses found in this disease. Lawrence G. Dunlap.

Pressman, J. J. **Iritis caused by asymptomatic sphenoiditis with anomaly of the sphenoid sinuses.** Arch. of Otolaryngology, 1937, v. 26, July, p. 83.

A case of bilateral acute iritis showed a cloudy right sphenoid sinus. Objectively the nose had shown no abnormality. The sinus was opened. Cultures made from the intensely reddened and edematous mucosa grew colonies of B. coli, nonhemolytic streptococcus and B. pyocyaneus. Irrigations led to cure in a relatively short time.

F. M. Crage.

Refatullah, M. **The ocular complications of diabetes with special reference to Bengal.** Proc. All-India Ophth. Soc., 1936, v. 5, pp. 15-25.

A general discussion of the complications of this disease, which is said to be common among the Bengalese.

Lawrence G. Dunlap.

Rones, Benjamin. **Senile changes and degenerations of the human eye.** Amer. Jour. Ophth., 1938, v. 21, March, pp. 239-255.

Steinberg, Werner. **Constitution and ocular tuberculosis.** Klin. M. f. Augenh., 1937, v. 99, Dec., p. 784.

For this study the author chose 100 male and 100 female patients each of whom had an eye lesion of probable tuberculous etiology, whose type of constitution could be unequivocally determined. For the latter purpose he used Kretschmar's smaller schema. He cannot corroborate Brückner's findings that patients with ocular tuberculosis are predominantly pyknic, and he suggests that possibly in Brückner's territory this type predominates in the entire population.

In the author's material, dysplasias were very numerous and the large number of hypogenital dysplasias with thyroid anomaly suggests that the atypic localization of the tuberculosis might be explainable by assuming a partial constitutional anomaly. The striking benignity of the associated pulmonary tuberculosis and the constantly favorable nutritional state of the patients suggest a status hypoplasticus of which status lymphaticus is a partial manifestation. The reason why atypical localization of the tuberculosis

takes place in the eye can presumably be sought in an organ predisposition.

F. Herbert Haessler.

18

HYGIENE, SOCIOLOGY, EDUCATION, AND HISTORY

Argyll Robertson, D. **Four cases of spinal miosis; with remarks on the action of light on the pupil.** Med. Classics, 1937, v. 1, May, p. 869.

(First published 1869.) The features presented by all four of the cases reported were (1) marked contraction of the pupil with insensibility to light but with further contraction during the act of accommodation for near objects, and (2) only moderate dilatation of the pupil by strong solutions of atropin. The author advanced the theory that contraction of the pupil under light was not due to reflex stimulation of the ciliary branches of the third nerve which supplied the circular fibers of the iris but to a normal, temporary reflex paralysis of the ciliospinal nerves.

Edna M. Reynolds.

Argyll Robertson, D. **On an interesting series of eye symptoms in a case of spinal disease, with remarks on the action of belladonna on the iris, etc.** Med. Classics, 1937, v. 1, May, p. 851.

In this historic document first published 1869, a case of miosis associated with spinal disease was reported, in which the fundi showed signs indicative of embolism of the retinal artery. The author advanced the hypothesis that the spinal affection was also due to embolism. The anatomy and physiology of the mammalian iris were considered and the various causes of miosis discussed. Various theories regarding the action of atropin on the pupil were reviewed. Color blindness as a frequent symptom of advancing amaurosis was mentioned and several cases were cited in which color blindness was associated with severe nervous symptoms. Edna M. Reynolds.

Argyll Robertson, D. **On the calabar bean as a new agent in ophthalmic medicine.** Med. Classics, 1937, v. 1, May, p. 877.

(First published 1863.) The author served as experimental subject. He desired to find a drug which would stimulate the muscle of accommodation and the sphincter pupillae, which would in short produce effects exactly opposite to those resulting from the use of atropine. He found that local applications of the calabar bean to the eye induced "myopia" and caused contraction of the pupil, with sympathetic dilatation of the pupil of the other eye. Atropine was found capable of overcoming its effects, and vice versa. The calabar bean was regarded as a stimulant of the ciliary nerves.

Edna M. Reynolds.

Banerjee, Jyotirmoy. **State of vision of Indian students of Calcutta.** Calcutta Med. Jour., 1936, v. 31, Oct., p. 192; Dec., p. 299; and 1937, v. 32, April, p. 181.

This is a statistical review of the refractive errors in students of different schools and colleges in Calcutta.

M. E. Marcove.

Crocker, F. B. **Eye health primer for nurses.** Sight-Saving Review, 1936, v. 6, March, p. 33.

The author outlines ocular hygiene for guidance of nurses in all branches of the nursing field. Prenatal as well as postnatal care is emphasized. Fifty-one percent of blindness among children is due to congenital and hereditary causes, and in adults the most

common causes are said to be cataract, optic atrophy, glaucoma, corneal ulceration, uveitis, choroiditis, chorioretinitis, and retinal degeneration.

Eye accidents in children are due to weapons, fireworks, sharp pointed objects, games and sports, automobile accidents, and burns. Accidents in industry are due to flying chips of metal, mineral, or wood; to splashing of chemical liquids; exposure to radiant heat; and explosions of various kinds.

M. E. Marcove.

Demaria, E. B. **Trachoma in Santa Fé Province, particularly in the General Obligado Department.** Arch de Oft. de Buenos Aires, 1937, v. 12, Nov., p. 685.

Trachoma was practically unknown in the Argentine, and in the rest of America, until about the middle of the last century, when it was introduced by the waves of immigration from across the seas. It found a favorable soil in Santiago del Estero and Tucumàn, with their sandy soil, lack of water, lack of housing, and crowding. This region is now the center of "the subtropical zone of endemic trachoma." Rigid exclusion of trachomatous immigrants and an antitrachoma campaign have considerably reduced the incidence of trachoma in the larger cities. The agricultural settlements however are still heavily infected. Stress is laid on the method of trachoma eradication by school inspection and visiting nurses so as to reach the very young among whom the disease is frequently unsuspected but easily cured.

M. Davidson.

Dollfus, M. A. **Ophthalmology in ancient Egypt.** Arch. d'Opht.-Rev. Gén. d'Opht., 1937, v. 1, Nov., p. 985.

This is a very entertaining and interesting historical paper on ophthalmology as practised by the Egyptians from 3000 B.C. to 900 A.D. The sources for this study were: (1) classical historians of Greece and Rome; (2) paintings on the tombs; (3) monuments; (4) objects found in the tombs; (5) anatomic and pathologic study of mummies; and (6) most important of all, the Papyri. The article is enriched with ancient case reports.

Derrick Vail.

Esser, A. M. **The eye in snow and frost in classic literature.** Klin. M. f. Augenh., 1938, v. 100, Jan., p. 100.

Esser has collected references to the effect of cold and freezing on the eye in Greek and Roman literature.

F. Herbert Haessler.

Fellows, M. F. **Eyeground examination as an aid to prognosis in general medicine.** Jour.-Lancet, 1937, v. 57, July, pp. 294-295.

The author describes various types of retinitis, such as that in pregnancy, and pleads that general physicians and obstetricians should use the ophthalmoscope and pay attention to the fundi in determining prognosis and treatment.

Ralph W. Danielson.

Ferree, C. E., and Rand, G. **Human factor in airplane crashes.** Arch. of Ophth., 1937, v. 18, Nov., pp. 789-795.

Tests with an electric multiple-exposure tachistoscope are recommended before the flight, to prevent an aviator from going into the air when he is clearly and dangerously unfit for service. Tests at the end of the flight would indicate how well the aviator has stood the strain of his service and give valuable information as to his susceptibility to fatigue. From the results of these tests graphs could be plotted which

would give a composite picture of the aviator's fitness, his endurance, his susceptibility to fatigue, and the consistency of his service.

J. Hewitt Judd.

Greeff, R. **What pictures of Albrecht Graefe do we have? Three unknown illustrations with Graefe.** Graefe's Arch., 1937, v. 138, pt. 3, p. 211.

The author is occupied in collecting and comparing all pictures of Graefe that have been preserved. The first of three almost entirely unknown illustrations of him appeared in 1857 as a woodcut in the periodical "Die Gartenlaube." This woodcut is designated: "A. v. Graefe operating for cataract, 1857." In the latter year, Graefe was 29 years old and had directed for five years a private clinic in Karlsstrasse in Berlin. On a chair with curved back sits a young woman or girl facing a window. Seated on a chair and facing the patient is Graefe with copious loose dark hair falling to his shoulders and a thick beard completely covering the mouth. Three young men stand in the background, evidently eye physicians, pupils of Graefe. Students from Belgium, France, England, and all parts of Germany were accustomed at this time to gather to watch Graefe operate and to listen to his interspersed remarks. The operation depicted is obviously that of discission for cataract in youth. In 1855 the famous work of Graefe on this subject had appeared in the first volume of Graefe's Archives. This method of operating upon the eye with the patient and surgeon sitting facing each other is the old classical method. For operating thus upon either eye, the surgeon must be ambidextrous.

The second picture is also a woodcut from the periodical "Die Gartenlaube" of 1865. The picture is called: "In Graefe's waiting-room." In 1872, Graefe was able to take in "Unter den Linden" expensively furnished quarters which he occupied until his death. A third unknown picture of Graefe is labeled: "A. v. Graefe in the clinic for eye patients." It shows Graefe standing at the left side of a seated patient with his right hand on the patient's forehead and the left hand extended forward in an explanatory gesture.

H. D. Lamb.

Greeff, R. **Santa Lucia, the patron saint, helper, and saviour of the blind and those with diseased eyes.** Klin. M. f. Augenh., 1938, v. 100, Jan., p. 97.

Greeff publishes notes (with two illustrations) on the treatment of Santa Lucia in literature and art.

F. Herbert Haessler.

Groenouw. **What eye afflictions produce invalidity?** Klin. M. f. Augenh., 1937, v. 99, Dec., p. 814.

The author discusses compensable eye lesions in relation to German law.

F. Herbert Haessler.

Hamilton, J. B. **The significance of heredity in ophthalmology. Preliminary survey of hereditary eye diseases in Tasmania.** Brit. Jour. Ophth., 1938, v. 22, Jan., p. 19; Feb., p. 83; and March, p. 129.

By means of three tables, setting forth respectively the hereditary abnormalities of the nervous system associated with eye defects, hereditary digital anomalies in relation to eye defects, and miscellaneous hereditary abnormalities associated with eye defects, the author attempts to establish the proportion of hereditary eye disease in Tasmania. A rough estimate places the case incidence at 2.5 to every

hundred. Major causes of blindness in Tasmania, attributable to a considerable extent to hereditary defects, are set forth by table, and also the causes of hereditary blindness in Tasmania. Sociologic problems, education of the blind, local conditions, and employment and welfare of the affected are gone into at considerable extent, with references following each group discussion. A discussion as to prevention of hereditary eye disease concludes the article. D. F. Harbridge.

Holtzer, B. F. **The adjustment of the newly blind.** Outlook for the Blind, 1937, v. 31, April, pp. 47-51.

In the Eye Institute of the Medical Center in New York City an experiment was tried in the immediate adjustment of the newly blind patient by a blind social worker. No time should be lost before the work of adjusting the newly blind person begins. In this article the advantages of such an immediate adjustment are emphasized and the technique of effecting it is described. Several case reports are cited. Ralph W. Danielson.

Kirwan, E. O'G. **Early ophthalmologists in Calcutta.** Brit. Jour. Ophth., 1937, v. 21, Dec., pp. 638-644.

Beginning with the first properly organized hospital in Calcutta, as of 1790, biographical data and scientific activities of the early ophthalmologists of that region are described. (References.) D. F. Harbridge.

Knighton, W. S. **A simple set-up for external eye photography.** Amer. Jour. Ophth., 1938, v. 21, March, p. 300.

Maggi Zavalia, J. **The prophylaxis of blennorrhea neonatorum.** Arch. de Oft. de Buenos Aires, 1937, v. 12, Nov., p. 715.

The new legislation adopted in the Province of Santa Fé, making obligatory the Credé method, registration of birth within three days, and reporting of the midwife who delivered the child, is outlined. M. Davidson.

Mendoza, Rafael. **The eye is designed for functioning in indirect illumination.** Rev. Cubana Oto-Neuro-Oft., 1937, v. 6, July-Aug., p. 84.

The advantages of indirect lighting and the harmfulness of direct lighting are pointed out. M. Davidson.

Pergola, Alfredo. **The antitrachomatous campaign in the Province of Sassari.** Rassegna Ital. d'Ottal., 1937, v. 6, Sept.-Oct., p. 559.

This is a statistical article demonstrating the progress made during the period from 1932 to 1937 in the fight against trachoma. An intensive prophylactic and curative campaign has been waged under government control, resulting in a remarkable reduction of the disease. (One fig.) Eugene M. Blake.

Villard, H. **An oculist who became pope, Pietro Hispano—John XXI.** Ann. d'Ocul. 1937, v. 174, Dec., pp. 832-837. Also Bull. Soc. Franç. d'Opht., 1937, v. 50, p. 61.

Pietro Hispano was born in Lisbon in 1215 or 1226. After attending the University of Paris he studied medicine at Siena, becoming later the physician to the papal court. On September 20, 1276, he was elevated to pope, taking the name of John XXI. He was killed in May, 1277, by a falling ceiling.

His medical contribution consists of two books "Thesaurus Pauperum" and "Liber Oculorum." The first is a home medical adviser and the second a work on the anatomy, physiology, pathology, and therapeutics of the eye. The ocular therapeutics consisted of the usual very

involved semimagical remedies of the day. Directions and rituals for the preparation of medicaments were given.

John C. Long.

19

ANATOMY, EMBRYOLOGY, AND COMPARATIVE OPHTHALMOLOGY

Damel, C. S., and Fortin, P. **The retinal vessels of the bat.** Arch. de Oft. de Buenos Aires, 1937, v. 12, Nov., p. 762.

Attention is called to Kolmer's studies of the bat's retina, which is avascular and is nourished by papillae projecting into it from the choroid and giving it a velvety appearance.

M. Davidson.

Klauber, E. **Eye changes in a hypophyseal dwarf.** Ceskoslovenska Ofth., 1937, v. 3, no. 1, pp. 64-66.

A hypophyseal dwarf, 25 years old, 125 cm. in height, suffered from pigment degeneration of the retina, and also glaucoma. There was direct relation—embryonic, anatomic, and functional—between the hypophyseal hypothalamus on the one side and the tapetoretinal tissue on the other. In a man 42 years old, 155 cm. in height, of small feminine appearance, a large hypophyseal tumor developed, resulting in atrophy of the optic nerve.

Georgiana D. Theobald.

NEWS ITEMS

Edited by Dr. H. Rommel Hildreth
640 S. Kingshighway, Saint Louis

News items should reach the Editor by the twelfth of the month

Deaths

Dr. James M. Smith, Valdosta, Ga., died January 8, 1938, aged 62 years.

Dr. George Leslie Strader, Cheyenne, Wyo., died January 21, 1938, aged 67 years.

Dr. J. William Scales, Pine Bluff, Ark., died December 4, 1937, aged 73 years.

Dr. George H. Mathewson, Montreal, formerly Professor of Ophthalmology of Bishops College and later at McGill University, died suddenly on March 18, 1938.

Miscellaneous

The National Society for the Prevention of Blindness has announced that college credit courses for the training of teachers and supervisors of sight-saving classes will be offered at the 1938 summer sessions of the following institutions: Tulane University, New Orleans, Louisiana, June 13th to July 23d; Miss Mercedes Kenner, New Orleans Public Schools, director of the course. University of Cincinnati, Cincinnati, Ohio, June 20th to July 26th; Miss Estella Lawes, director of the department of sight conservation, Cincinnati Public Schools, director of the course. University of Washington, Seattle, Washington, June 20th to July 20th; Miss Rena P. Cummings, Head of the sight-saving department, Seattle Public Schools, director of the course. University of Hawaii, Honolulu, Territory of Hawaii, June 27th to August 5th; Mrs. Winifred Hathaway, Associate Director of the National Society for the Prevention of Blindness, director of the course. Wayne University, Detroit, Michigan, June 27th to August 5th; Mrs. Gladys D. Matlock, of Detroit, Michigan, director of the course. State Teachers College, Buffalo, New York, July 5th to August 12th; Miss Matie M. Carter, Supervisor, Physically Handicapped Children's Bureau, State Education Department, Albany, N.Y., director of the course. Teachers College, Columbia University, New York, N.Y., July 6th to August 13th; Miss E. Louise Rush, of Toronto, Canada, instructor of the course. Details regarding the courses may be obtained from the University or College, or from the director in charge of the course.

A conference on conservation of sight and hearing was held at the City College, College of the City of New York, March 15, 16, 17, 18, 1938.

The Chicago Tumor Institute opened March 21, 1938, offering consultation service to physi-

cians in the diagnosis and treatment of cancer and radiation facilities for cancer patients. The Institute also proposes to conduct research and to offer training to physicians who may wish to qualify as specialists in the study and treatment of this disease.

The Association for Research in Ophthalmology will present the following program at the June, 1938 meeting, in San Francisco:

1. Treatment of experimentally produced exophthalmos with thyroxin and other iodine compounds, by George K. Smelser, Ph.D., New York.
2. Experimental studies of the pathogenicity of staphylococcus toxin, by James H. Allen, M.D. and A. E. Braley, M.D., Iowa City.
3. Eye lesions in experimental infections with special reference to arthritis, by Conrad Berens, M.D., D. Murray Angevine, M.D., Loren Guy, M.D., and Sidney Rothbard, M.D., New York.
4. Studies on the ocular fluids. II. The hexosamine content, by Karl Meyer, M.D., New York.
5. The influence of the central nervous system on the pigment migration in the retina of the frog, by H. Burian, M.D., Hanover, New Hampshire.
6. Inclusion blennorrhea; A study of the pathologic changes in the conjunctiva and cervix, by A. E. Braley, M.D., Iowa City.
7. Influence of dinitrophenol on the production of experimental cataracts by lactose, by W. E. Borley, M.D. and M. L. Tainter, M.D., San Francisco.
8. Glaucoma: Classification, cases, and surgical control (results of microgonioscopic research), by Otto Barkan, M.D., San Francisco.

Societies

The Seventy-fourth Annual Meeting of the American Ophthalmological Society will be held at The Mark Hopkins Hotel, San Francisco, June 9, 10, 11, 1938. The Executive Session will be held Wednesday evening, June 8th, and the regular meetings will be held mornings only.

The Annual Congress of the Ophthalmological Society of the United Kingdom was held in London on April 28, 29, 30, 1938. The differential diagnosis of the causes of exophthalmos was the subject discussed.

The Philadelphia County Medical Society, Section on Ophthalmology, presented the following program on April 7th; Dr. E. B. Spaeth, Anatomy and pathology of the lacrimal apparatus; Dr. W. E. Fry, Medical ophthalmology; Dr. S. L. Olsho, Refraction findings and effective glasses; Dr. Harry S. Weaver, Jr., Sulfanilamide in gonorrheal ophthalmia; Dr. Carroll R. Mullen, Clinical experiences with sulfanilamide; Dr. M. E. Smukler, O'Connor cinch operation simplified (motion picture).

Personals

The seventieth birthday of Moritz von Rohr was celebrated on April 4th of this year. He has been associated with the Carl Zeiss Company of Jena for 43 years and in his early years worked with such leaders in optics as Professor E. Abbe and P. Rudolph. As a mathematician, the corrections which he has calculated are still the foundation of the optical excellence of many photographic objectives and microscopes in use today.

His monumental work in the field of ophthalmology was in the development of a spectacle lens which allowed the user to take advantage of the natural mobility of his eyes in covering a wide field of vision without the loss of correction when looking obliquely through glasses. This new type of lens was first made available under the trade name "Punktal." It was the theoretical work of this scientist which first made telescopic spectacles practical.

Dr. Ferdinand Koch, now at Mayo Clinic, has been appointed Medical Ophthalmologist to the Eye Institute of Columbia-Presbyterian Medical Center, New York.

Dr. John S. McGavic of Cincinnati has been appointed from July 1, 1938, as Research Associate in Ophthalmology at the Eye Institute of Columbia-Presbyterian Medical Center, New York.

Dr. Manuel Uribe Troncoso was nominated Associate Member of the Belgian Ophthalmological Society at its meeting in Bruxelles, November 28, 1937.

Sir John Parsons and Mr. Leslie Paton have been made honorary members of the Royal Society of Medicine of Budapest on the centenary of the foundation.

Appointed recently at the West London Hospital are: Consulting Ophthalmic Surgeon, Mr. H. P. Gibb; Ophthalmic Surgeon, Mr. R. C. Davenport, and Assistant Ophthalmic Surgeon, Mr. P. McG. Moffatt.

Dr. Charles Ainsworth Marrin announces the opening of an office for the practice of ophthalmology, 30 West 59th Street, New York City.